Ontario

ONTARIO GEOLOGICAL SURVEY

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Report of Activities, 2000
Resident Geologist Program

Thunder Bay South Regional Resident Geologist Report:
Thunder Bay South District

by

B.R. Schnieders, J.F. Scott, M.C. Smyk, M.S. O'Brien, R. Debicki and A. Drost

2001

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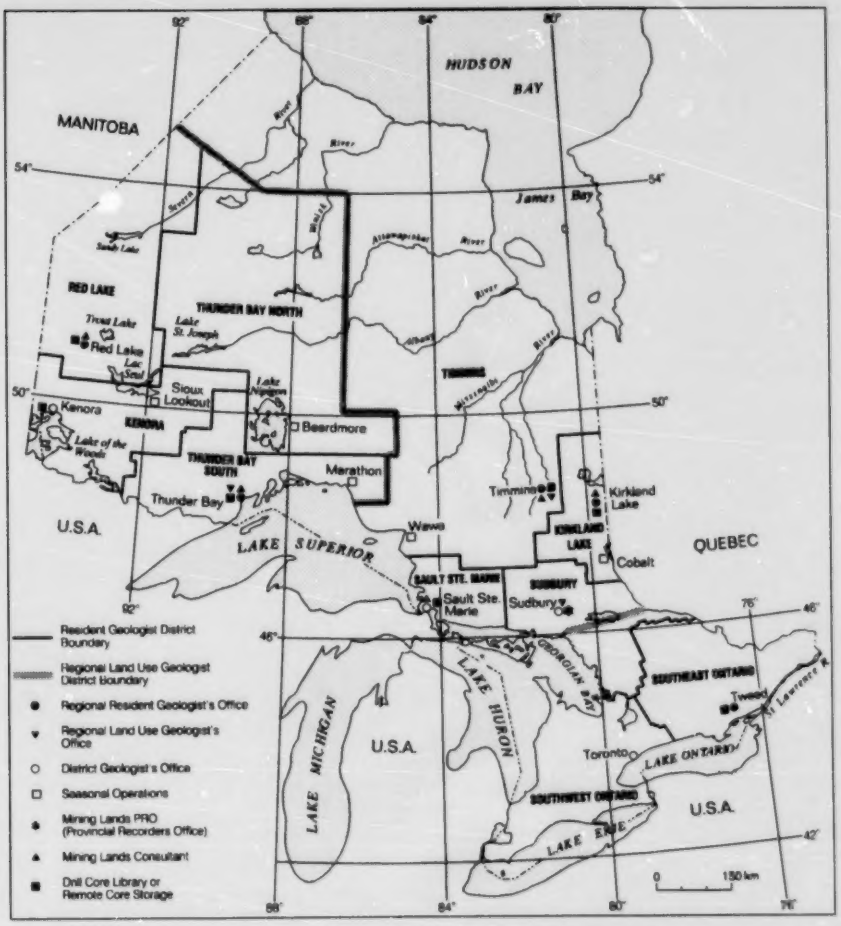

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM

REPORT OF ACTIVITIES – 2000

THUNDER BAY SOUTH
REGIONAL RESIDENT GEOLOGIST REPORT

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Ontario Geological Survey
Regional Resident Geologist Program

Thunder Bay South Regional Resident Geologist (Thunder Bay South District)--2000

by

B.R. Schnieders, J.F. Scott, M.C. Smyk and M.S. O'Brien

2001

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Thunder Bay South Regional Resident Geologist (Thunder Bay South District)--2000

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INTRODUCTION

The Thunder Bay South District covers an area from Calm Lake, west of Atikokan, east to White River, and north to Armstrong from the U.S. border. The District Program is based in Thunder Bay, but also maintains a seasonal field office in Marathon.

MINING ACTIVITY

There were four producing, precious and base metal mines, as well as a marble quarry, several amethyst producers and an agate mine in the Thunder Bay South District in 2000.

Agate

THUNDER BAY AGATE MINE

The Thunder Bay Agate Mine opened in July, 1997, and is located in MacGregor Township, on the west side of Highway 527 (Spruce River Road), 1 km north of the intersection with Highway 11-17. The mine is owned by D. Seargeant and N. Maunula. It is estimated that up to 30 000 people visited the site in 2000 (D. Seargeant, Thunder Bay Agate Mine, personal communication, 2001).

Agate occurs as a conformable layer or vein hosted by flat-lying, Animikie sedimentary rocks, in contact with a diabase sill. The agate layer varies up to 1 m in width and has been traced by stripping over a 1 km strike length. The banded and variegated agate has been previously referred to as fortification agate and Current River agate, and varies in colour (e.g. colourless, white, grey, black, yellow, orange, blue, beige, buff and red). The agate likely formed in an open-space environment, as evidenced by stalactitic textures and concentrically zoned orbicules (Thunder Bay Agate Mine, World Wide Website, http://www.agatemine.com).

Amethyst

Two areas northeast of Thunder Bay are well-known for amethyst veins and production. In the area along the Magone Lake Road, north of MacGregor Township, five sites see periodic, small-scale extraction of amethyst. In McTavish Township, eight deposits are accessible from the Trans-Canada Highway, four of which operate as seasonal tourist attractions. The Blueberry Amethyst patch also operates as a seasonal tourist attraction, north of Kakabeka Falls.

Local deposits and mines are listed below:

Deposit / Mine	Location	Owner(s)
Amethyst Mine Panorama	McTavish Township	S. and T. Lukinuk
Bak Quarry	McTavish Township.	D. Bak
Blueberry Amethyst Patch	Oliver Township	J. and T. Hakala
Blue Points Amethyst Mine	McTavish Township	F. Grann
Boulder Creek Amethyst	North of MacGregor Township	C. Anderson
Breezy Mountain Amethyst Mine	McTavish Township	T. Twomey
Crystal Creek Amethyst Mine	North of MacGregor Township	R. Hietapakka
Diamond Willow Amethyst Mine	McTavish Township	D. Noyes
Gem Mountain Amethyst Mine	North of MacGregor Township	O. and R. Harty
Keetch Amethyst Quarry	McTavish Township	N. Keetch
Ontario Gem Amethyst Mine	McTavish Township	P. Marino
Purple Haze Mine	North of MacGregor Township	M. and S. Grieve
Thibault Amethyst Quarry	North of MacGregor Township	D. Thibault
Welch Farm Amethyst Quarry	McTavish Township	C. Anderson

The Honourable Leo Bernier, Minister of Natural Resources, selected amethyst as Ontario's mineral emblem on May 14, 1975 and the Mineral Emblem Act received Royal Assent on July 8, 1975. To celebrate the 25th anniversary of these events OGS staff assembled two displays, revised the amethyst brochure, and created an internet site (http://www.gov.on.ca/MNDM/MINES/OGS/amethyst/index.htm). The first display incorporated exquisite specimens and amethystine products from each of the local amethyst producers as well as two posters depicting the history of the amethyst industry in the Thunder Bay area. This display was exhibited at the Northwestern Ontario Mines and Minerals Symposium in mid-April and the Thunder Bay Mining and Mineral Show in early May. A second display, consisting of amethystine specimens and posters, was presented at the open house celebrations on the site of Amethyst Mine Panorama in early July. Copies and originals of the revised, bilingual amethyst brochure were distributed to producers and attendees. Leo Bernier, local dignitaries, and federal, provincial and local politicians, attended this event. Cameron Clark, Deputy Minister of the Ministry of Northern Development and Mines, represented the provincial government.

Stone

RUBY LAKE MARBLE LTD.

The Ruby Lake Marble Ltd. quarry, located approximately 10 km southeast of Nipigon, is owned and operated by D. MacAlpine and G. Landry. Variegated, multi-coloured, banded marble was quarried for landscaping stone. Approximately 676.3 t of marble were quarried and shipped in 2000 (D. MacAlpine, Ruby Lake Marble Ltd., personal communication, 2001). 49.6 t of red siltstone from an adjacent site, north of Highway 17, was also shipped. The majority of the stone is sent to southern Ontario, with the remainder going to Alberta, Manitoba and the midwestern United States (*ibid*). Additional information is provided on their World Wide Website (http://www.rubylakemarble.com).

This marble consists of metamorphosed, Mesoproterozoic, Rossport Formation (Sibley Group) dolostone and other, calcareous sedimentary rocks in the contact metamorphic aureole of Keweenawan diabase sills. It has previously been termed Nipigon River marble and was quarried from 1883 to *ca.* 1910 at a site on the eastern side of the Nipigon River, approximately 6 km west of the Ruby Lake quarry (Hinz *et al.* 1994).

Gold

The three Hemlo mines (David Bell, Golden Giant and Williams mines) continue to produce gold from the Hemlo deposit. In 2000, these three mines collectively produced 919 292 ounces of gold, and similar production is expected in 2001. The David Bell and Williams mines produced gold at a total cash cost of US$187 per ounce. The Golden Giant Mine had a cash cost of US$148 per ounce (Company Press Release, November 10, 2000; The Northern Miner, November 13-19, 2000). The Golden Giant Mine has reserves outlined to continue production for the next 4 years, while the David Bell Mine has reserves outlined for the next 7 years, and the Williams Mine for the next 9 to 10 years.

DAVID BELL MINE (TECK-CORONA OPERATING CORPORATION)

Production from the David Bell Mine (Teck Corporation (50%) / Homestake Canada Inc. (50%)) from January 1, 2000 to December 31, 2000 consisted of 182 549 recovered ounces of gold from 448 492 t milled at a mill feed grade of 12.66 g/t Au (T. Madill, Teck-Corona Operating Corporation, personal communication, 2001).

Mineable and diluted ore reserve estimates as of January 1, 2001 were 3 727 237 t at a grade of 10.90 g/t Au (uncut; 10.31 g/t Au cut grade) (*ibid*). This figure includes 62 500 tonnes at a grade of 8.52 g/t Au on the Quarter Claim. This represents David Bell's 50% net profit royalty under the terms of their agreement with Battle Mountain Canada Ltd.

A re-evaluated, near-surface, mineral resource of 680 278 tonnes (undiluted), grading 3.77 g/t Au, lies at the west end of the David Bell Mine property, directly beneath Highway 17 (*ibid*). This includes the main "A" zone lens (561 841 t grading 3.91 g/t Au) and the "D" zone lens (118 437 t grading 3.09 g/t Au). The feasibility of mining this resource will be evaluated in 2001 (*ibid*).

4445 m of underground drilling was carried out in 2000 to further define the "A" and "D" zones east of the shaft between 5 and 7 levels. Most of the 235 000 tonnes added to the reserves were in this area. An additional 594 m of surface drilling was completed to confirm an earlier surface intersection on the eastern edge of the deposit. However, no ore was found as a result (*ibid*).

GOLDEN GIANT MINE (BATTLE MOUNTAIN CANADA LTD.)

Production from the Golden Giant Mine from January 1, 2000 to December 31, 2000 consisted of 334 000 recovered ounces gold from 1 070 456 t milled at a grade of 9.88 g/t Au (H. Lockwood, Battle Mountain Canada Ltd., personal communication, 2001). Reserves as of January 1, 2001, stand at 4 335 500 t at a grade of 9.8 g/t Au (i.e. 1 369 000 contained ounces gold, fully diluted) (*ibid*).

In Block 4b, the first development in ore began in January 2001, and the first production will occur in late 2001. In Block 5, the shaft project is ongoing, and ore development will begin in September 2001. No present exploration drilling is ongoing at the mine.

The merger of Battle Mountain Gold Company, with a wholly owned subsidiary of Newmont Mining Corporation, was approved by Battle Mountain shareholders on January 5, 2001 (News Release, January 11, 2001).

WILLIAMS MINE (WILLIAMS OPERATING CORPORATION)

The Williams Mine (Teck Corporation (50%) / Homestake Canada Inc. (50%)) produced 414 000 ounces of gold from 2 497 000 tonnes of ore, from January 1, 2000 to December 31, 2000 (G. Skrecky, Williams Operating Corporation, personal communication, 2001). Proven and probable ore reserves (diluted) as of January 1, 2001, stand at 22 751 000 t at a grade of 4.85 g/t Au (3 547 700 contained ounces Au) (*ibid*).

Platinum Group Elements

LAC DES ILES MINE (LAC DES ILES MINES LTD.)

North American Palladium Ltd. produced palladium, platinum, nickel, copper and gold from its Lac des Iles mine site, 100 km north of Thunder Bay. Production figures for the first three-quarters of 2000 are given below (North American Palladium Ltd., World Wide Website, http://www.napalladium.com):

Year	Tonnes Milled	Concentrate (tonnes)	Palladium (oz)	Gold (oz)	Platinum (oz)	Copper (lb)	Nickel (lb)
First three-quarters of 2000	663 955	10 652	74 487	4196	4531	898 179	647 606

North American Palladium Ltd. is undertaking a $208 million expansion of the Lac des Iles Mine, based on a detailed feasibility study completed by AGRA Simons in May, 2000. Pre-production stripping for the expanded open pit began in July 2000, and construction of a new 15 000 tonne per day concentrator is on schedule and on budget for commissioning in the second quarter of 2000. It will replace the current 2400 tonne per day facility (North American Palladium Ltd., World Wide Website, http://www.napalladium.com).

At full production, starting in 2002, annual output will average approximately 250 000 ounces of palladium, 21 600 ounces of platinum, 16 300 ounces of gold, 5.6 million pounds of copper and 1.9 million pounds of nickel for a minimum of 11 years, according to the current mine plan. Total cash costs over the mine life, net of other metal credits and including royalty, are estimated at US$160 per ounce of palladium. Production from the current operation is being maintained during construction. When construction is completed, the mine site workforce is expected to be 250, compared to the pre-expansion level of 130 (*ibid*).

North American Palladium Ltd. completed 116 000 m of diamond drilling at the Lac des Iles Mine in 2000 (M. Lavigne, North American Palladium Ltd., personal communication, 2001). The Roby Zone has been extended down to a depth of 600 m. Exploration is focussing on the Twilight Zone to the east of the present open pit. It is expected that the Twilight Zone will significantly contribute to the increase in the palladium resource at the Lac des Iles Mine in the short term (News Release, April 24, 2000). The drilling program tested pyroxenite and breccia mineralization in the Roby Zone, while in the North Roby Zone, vari-textured gabbro and gabbro breccia was intersected. Intersections of up to 55.2 m of 5.51 g/t Pd, 0.26 g/t Pt and 0.35 g/t Au were encountered in the Roby Zone. Twilight Zone breccia-style, mineralized zones generated intersections of up to 148.2 m grading 2.07 g/t Pd, 0.23 g/t Pt, and 0.17 g/t Au.

According to the feasibility study, the total mineralized material (which includes the proven and probable reserves but excludes inferred mineralized material) at the mine was estimated to be 94.1 million tonnes with an average grade of 1.66 g/t Pd, 0.18 g/t Pt, 0.14 g/t Au, 0.06% Cu and 0.05% Ni (Company

Preliminary Prospectus, August 30, 2000). An interim resource of 121.7 million tonnes grading 1.63 g/t Pd, 0.18 g/t Pt, 0.13 g/t Au, 0.06% Cu and 0.05% Ni was estimated by AGRA Simons, based on cut-off grade of 0.70 g/t Pd and incorporating the results of 58 000 m of core drilling completed in the first seven months of 2000. (It also includes proven and probable reserves.) (North American Palladium Ltd., World Wide Website, http://www.napalladium.com). During the second quarter of 2001, current exploration program results will be incorporated in a new resource estimate (M. Lavigne, North American Palladium Ltd., personal communication, 2001).

Table 1. Mine production and reserves in the Thunder Bay South District in 2000.

Mine	Production to end of 1999		Production in 2000		Reserves at end of 2000	
	Tonnage @ Grade	Total Commodity	Tonnage @ Grade	Total Commodity	Tonnage	Grade
David Bell Mine	6 053 365 t @ 0.487 ounce Au per tonne (= 15.15 g/t Au)	2 947 252 ounces Au	448 492 t @ 12.66 g/t Au	182 549 ounces Au[1]	3 727 237 t	10.90 g/t Au (uncut)
Golden Giant Mine	14 419 129 t @ 0.370 ounce Au per tonne (= 11.51 g/t Au)	5 329 270 ounces Au	1 070 456 t @ 9.88 g/t Au	334 000 ounces Au	4 335 500 t	9.8 g/t Au
Lac des Iles Mine	3 844 279 (grade unknown)	351 849 ounces Pd, 24 165 ounces Pt, 22 972 ounces Au, 5 844 120 lbs. Cu, 4 471 486 lbs. Ni	663 955 t milled (grade unavailable) *(n.b. production for first three-quarters, 2000)*	74 487 ounces Pd, 4196 ounces Au, 4531 ounces Pt, 898 179 lbs. Cu, 647 606 lbs. Ni *(n.b. production for first three-quarters, 2000)*	94 100 000 t	1.66 g/t Pd, 0.18 g/t Pt, 0.14 g/t Au, 0.06% Cu, 0.05% Ni
Williams Mine	29 480 404 t @ 0.203 ounce Au per tonne (= 6.31 g/t Au)	5 984 815 ounces Au	2 497 000 t @ 0.166 ounce Au per tonne	414 000 ounces Au	22 751 000 t	4.85 g/t Au

[1] *includes 512 ounces recovered from sedimentation pond in 1998*

EXPLORATION ACTIVITY HIGHLIGHTS

Nickel-Copper-Platinum Group Element Exploration

Avalon Ventures Ltd. and **Starcore Resources Ltd.** intersected a 9.95 m interval of 2.04 g/t Pd, 0.41 g/t Pt, 0.71 g/t Au, 0.42% Cu, and 0.13% Ni from hole L00-08, on their Legris Lake property. In addition, lower in the hole two sub-zones assayed 3.8 m of 2.92 g/t Pd+Pt+Au, and 3.0 m of 1.88 g/t Pd+Pt+Au. This represents the best intersection received to date on the property (Company Press Release, November 10, 2000).

Geomaque Explorations Ltd. has optioned the Marathon Project of **Polymet Mining Corp**. The previous Anaconda or Fleck property has reserves of 37 million tonnes averaging 1.1 g/t Pd, 0.27 g/t Pt, 0.21 g/t Au, 1.85 g/t Ag, 0.38% Cu and 0.032% Ni. This includes a resource of 1.3 million ounces of palladium and 320 000 ounces of platinum. Expenditures will be focused on producing a bankable feasibility study, and assessing the economics of the deposit under current market conditions (Company Press Release, November 7, 2000). A 3000 m drill program, designed to expand known mineralized

zones, is scheduled to begin at the end of January, 2001 (Company Press Release, January 3, 2001; World Wide Website, http://www.geomaque.com).

L.E.H. Ventures Ltd. has recently completed 1500 m of diamond drilling on the Geordie Lake property, located north of Marathon, in the Coldwell Complex. Assay results are pending. L.E.H. Ventures Ltd. have extended the mineralized zone at the Geordie Lake deposit to 1.35 km in length. Hole G00-08 intersected 16.28 m of 0.89 g/t Pd+Pt+Au and 0.436% Cu, including 7.10 m of 1.371 g/t Pd, 0.071 g/t Pt, 0.09 g/t Au, 4.7 g/t Ag, 0.716% Cu and 0.023% Ni. Further drilling is expected in 2001 (Company Press Release, November 29, 2000). An inventory of 159.7 million tonnes, valued at Cdn$25.74 per tonne has been suggested, including 39.9 million tonnes grading Cdn$57.78 per tonne. This is based on 13 diamond drill holes (Company Press Release, December 18, 2001).

New Millennium Metals Corporation has discovered several new PGE occurrences, located in the Core Zone and Awkward Lake intrusions, on their Ottertooth property. In the southern part, near the Core Zone intrusion, grab samples up to 1.23 g/t Pt+Pd, 1% Cu and 0.3% Ni were obtained. Further to the north, in the Awkward Lake intrusion, grab samples up to 0.33 g/t PGE, and greater than 1% Cu, 6 g/t Ag and 0.3% Ni were discovered (Company Press Release, November 9, 2000).

At Taman Lake, prospecting by New Millennium Metals Corporation led to the discovery of sulphide-mineralized, gabbroic boulders that returned up to 1.11 g/t Pt+Pd+Au. On the Lac des Iles River property, New Millennium has discovered the Powder Hill showing, with grab samples up to 2.8 g/t Pt+Pd+Au, and the Stocker zone with up to 2.2 g/t Pt+Pd+Au in float (D. Wagner, New Millennium Metals Corporation, personal communication, 2001). New Millennium Metals Corporation has identified 3 separate induced polarization (IP) anomalies on their Lac des Iles River property. One anomaly flanks the Powder Hill showing (*see* Property Visits, this report). Drilling programs are being contemplated, as well as additional IP and magnetic surveys over the Stocker Zone (*Canada Stockwatch*, January 17, 2001).

East West Resource Corp., in conjunction with **Canadian Golden Dragon Resources Ltd.** and **Avalon Ventures Ltd.** have released the results from drill hole WM00-03 from the Wolf Mountain project. A 4.5 m zone containing up to 2.82 g/t Pt+Pd, with elevated Au, 0.415% Cu and 0.21% Ni has been reported (Company Press Release, November 13, 2000). Within this intersection is a narrow layer of massive chalcopyrite-cubanite at the base of the mafic-ultramafic intrusion, in contact with Quetico Subprovince metasedimentary rocks. East West Resource Corporation proposes that they have confirmed a Noril'sk type setting for the Nipigon Basin. The company has further identified 3 strong, down-hole anomalies to the side and below hole WM00-05. Diamond drilling in hole WM00-05 intersected 2.1 m of 3.575 g/t Pt+Pd and 0.336% Cu and 0.214% Ni, and 4.2 m of 1.6 g/t Pt+Pd plus 0.26% Cu and 0.213% Ni (Company Press Release, December 5, 2000). East West Resource Corporation continues to diamond drill on the Wolf Mountain Project. Drilling has intersected three types of gabbro that support multiple intrusive events. Assay values of up to 2.82 g/t Pt+Pd over 1 m have been reported from hole WM00-03 (Company Press Release, November 13, 2000). Hole WM01-08 recently intersected 5.3 m of chalcopyrite-cubanite-pyrrhotite-pentlandite-mineralized gabbro-pyroxenite. The sulphide zone, correlated to a noticeable increase in the amount of copper mineralization, is hosted in the basal unit of the intrusion (Company Press Release, January 26, 2001).

Freewest Resources Canada Ltd.'s prospecting activities on their Moshkinabi, Goodchild and Bermuda properties have led to the discovery of several new PGE occurrences. The average of 228 surface samples collected from Skipper Lake zone on the Bermuda property (*see* Property Examinations, this report) is 0.58 g/t Pd, 0.14 g/t Pt, 0.08 g/t Au. Grab samples have indicated up to 4.1 g/t Pt+Pd+Au, from magnetite-ilmentite-apatite-olivine cumulate rocks hosted by gabbro. A series of grab samples over a 12 m wide exposure and returned an average grade of 1.05 g/t Pt+Pd+Au (Company Press Release,

April 18, 2000). The Moshkinabi property near Manitouwadge is also being explored. A PGE-anomalous, sulphide-mineralized zone has been traced over a strike length of 3 km; it ranges between 10 to 150 m in width (Company Press Release, September 1, 2000).

Classic Gold Resources Ltd. has entered into an agreement with **LMX Resources Ltd.** on the Haines Gabbro property (*Canada Stockwatch*, September 26, 2000). LMX Resources Ltd. and Classic Gold Resources Ltd. have reported a continuous channel saw sample yielding 8.22 g/t Pt+Pd over a sample length of 5.7 m. A UTEM electromagnetic survey was completed in December, 2000 and diamond drilling is slated for February, 2001 (Company Press Release, November 21, 2000).

Pacific Ridge Exploration Ltd. has entered into agreement with **Starcore Resources Ltd.** and **ProAm Explorations Corporation** on the Samuels Lake property, west of Atikokan. Surface stripping and channel sampling was conducted in October, 2000 (A. Eveleigh, Eveleigh Geological Consulting, personal communication, 2001).

Houston Lake Mining Inc.'s drill program on their Tib Lake property concluded after the completion of six drill holes, totaling 1037.6 m. Results from the first three holes include a 22 m intersection grading 1.456 g/t Pt+Pd+Au, 0.17% Ni and 0.15% Cu (in hole TL-00-16) (Company Press Release, October 24, 2000). Recent geological mapping identified an extensive area of chemically altered and sulphide-bearing, variably textured gabbro which strikes for more than 2.5 km and widens to about a kilometre between the Jewelweed and Kuhner palladium occurrences. The sixth drill hole of the program, TL-00-20, targeted the Jewelweed occurrence, where a government grab sample returned 1.25 g/t Pt+Pd+Au. TL-00-20 encountered a well-sulphidized, variably textured gabbro. Sulphides (pyrite, chalcopyrite and pyrrhotite) average 3 to 5% (*ibid*).

A new PGE occurrence was discovered by prospectors working for **1349563 Ontario Ltd**. The JR occurrence was discovered by Jeff Pinksen and Rob Varrin in the North Elbow Lake area. Preliminary assays from grab samples indicate up to 5 g/t Pt, 1.5 g/t Pd, 3.73% Cu and 0.6% Ni from hornblendite and pyroxenite near the contact of the North Elbow Lake intrusion (A. Eveleigh, Eveleigh Geological Consulting, personal communication, 2001). **Denstone Ventures Ltd.** has been granted an option to acquire a 50% interest in the property (Denstone Ventures Ltd., News Release, February 5, 2001).

LMX Resources Ltd. and **Buck Lake Ventures Ltd.** continued to explore their Buck Lake property. Channel sampling returned up to 0.99 g/t Pd+Pt+Au over 10 m (Buck Lake Ventures Ltd, World Wide Website, http://www.bucklakeventures.com; Press Release, August 8, 2000). Grab samples assayed as high as 8.3 g/t Pd+Pt+Au from the property (*ibid*). Further prospecting by North American Palladium Ltd. to the southwest has yielded grab samples up to 2.285 g/t Pd+Pt+Au (Buck Lake Ventures, Press Release, June 20, 2000).

Berland Resources Ltd. optioned the Roaring River property from Stares Contracting Corp. The property, located west of Lake Nipigon, covers an aeromagnetic anomaly, where mafic and ultramafic rocks have been identified. At the Mere showing assays of up to 1249 ppm Ni, 3159 ppm Cu and 1.1 g/t Pt+Pd+Au was reported, and at the Leigh (boulder) up to 2067 ppm Ni, 1920 ppm Cu and 1.23 g/t Pt+Pd+Au was reported from grab samples (Company Press Release, December 6, 2000).

Alto Minerals Inc. recently optioned the Loch Erne and Loch MacDougall properties in the Shebandowan greenstone belt. Previous drilling by Falconbridge Limited intersected values of up to 1.67% Ni and 2.98% Cu over 0.65 m. No analyses for PGE were completed (*Canada Stockwatch*, January 19, 2001). Follow-up sampling by Falconbridge in 1986 returned up to 0.19 g/t Pt and 0.90 g/t Pd over 2.13 m in hole LE4/69 (*ibid*).

McVicar Minerals Ltd. and **BHP World Exploration Inc.** have staked the Foxtrap property on the northwestern margin of the Coldwell Complex, near Marathon. The property was staked over an aeromagnetic anomaly associated with the border gabbro of the intrusion. A possible feeder for the Coldwell gabbro has been suggested, analogous to the geological setting of the Noril'sk deposits in Russia (Company Press Release, January 25, 2001).

Cassidy Gold Corp. and **Gryphon Metals Corporation** carried out prospecting on their Thunder Lake property in Conmee and Horne townships.

Gold Exploration

In 2000, **Teck Corporation** drilled their Stenlund, White River, Rous Lake and Toothpick East properties in the Hemlo greenstone belt. Teck had previously released diamond drilling results from the Stenlund (Heron Bay) property. A 7.3 m intersection of 9.3 g/t Au and 184 g/t Ag was reported (Teck Corporation, 1999 Annual Report). Further drilling is planned for the Heron Bay area and White River properties in 2001. Geological and geochemical surveys were also completed on the White River property. Teck has also optioned the Moses-Goodchild Lake property and carried out mapping, induced polarization, magnetometer, and VLF-EM surveys there (J. Paaki, Teck Corporation, personal communication, 2001).

Cameco Gold Inc. explored their Empress property, completing linecutting and geological mapping there in 2000 (M. Koziol, Cameco Gold Inc., personal communication, 2001).

Prospectors **George Daniels** and **Rudy Wahl** conducted stripping, trenching and sampling on their Mocan Valley Extension property located west of the Empress property, northeast of Terrace Bay. Initial assays of up to 4.17 g/t Au were generated (Resident Geologist's Files, Thunder Bay South District, Thunder Bay).

Base Metal Exploration

Prospecting in August, 2000 by **Dan Calvert** in Aldina Township, led to the discovery of a massive sulphide float boulder, approximately 3.05 m by 2.04 by 1.70 m in size (*see* Property Examinations, this report). The subangular to subrounded boulder contains stringer and massive sulphides, including sphalerite, pyrite, galena and chalcopyrite. Grab samples of the float assayed up to 30% Zn, 0.87% Pb, 0.42% Cu, 127 g/t Ag and 1.72 g/t Au. A 2 m chip assayed 6.48% Zn (Resident Geologist's Files, Thunder Bay South District, Thunder Bay). The property has been optioned by **Greater Lenora Resources Corp.** and **RJK Explorations Ltd.** who have completed 95 km of linecutting, as well as 85 km of magnetometer and 36 km of induced polarization (IP) surveys. Prospecting, backhoe stripping and water washing has identified a felsic, pyroclastic unit on the property. Drilling, started in late 2000, was continuing at the time of writing. Stripping uncovered faulted and fragmental felsic metavolcanic rocks, with stringer sulphides.

Atikokan Resources Inc. released results of their diamond drilling on their Lumby Lake property. Two holes totaling 1170 m tested separate IP anomalies. 73 m of zinc-copper-mineralized rock was intersected, with the best section assaying 0.37% Zn, 0.09% Cu and 23.4 g/t Ag over 12 m (Press Release, June 8, 2000). In addition, 40 km of Gradient-IP has been conducted in the Lumby, Herontrack and Spoon lakes area. The company is considering the acquisition of a joint-venture partner on this property (R. Bernatchez, Atikokan Resources Inc., personal communication, 2001).

Gemstar Resources Ltd. reported an agreement whereby it will acquire a 100% interest in the Dotted Lake property, south-southeast of Manitouwadge. The Fairservice zinc occurrence, north of Dotted Lake, consists of disseminated to semi-massive sphalerite, pyrite, magnetite and rare chalcopyrite in a zone 0.5 m wide by 10 m long within foliated, garnetiferous hornblende amphibolite, and biotite-chlorite-muscovite gneiss. Sampling of the mineralized zone has yielded assays of up to 12.0% Zn, 0.024% Cu and 0.074 ounce per ton Au (Schnieders *et al.* 1991). A detailed exploration of the property is also warranted for other similar occurrences (Company Press Release, October 27, 2000).

Diamond Exploration

Freewest Resources Canada Inc. entered into an agreement with **SouthernEra Resources Ltd.** and **Sparton Resources Inc.** to explore for diamonds and other minerals in Ontario. The agreement provides Freewest with a 20% interest in a diamond exploration program covering an area of approximately 7000 km^2 in the Superior Province. Sparton has a 20% participating interest in this project, and SouthernEra, as operator of any diamond exploration programs, holds a 60% interest. Earlier in 2000, in cooperation with an independent consultant, the three-company joint venture identified a number of geophysical targets in the area with kimberlite pipe-type signatures. Subsequent claim staking activities resulted in the acquisition of a number of these targets. Follow-up, detailed airborne magnetic and electromagnetic surveys were completed on several of the claim groups, using the new Aerotem®, helicopter-borne geophysical system. Within the area of interest (including the region between Marathon and Manitouwadge) there are also a number of potential PGE targets requiring evaluation (Company Press Release, October 23, 2000).

Numerous breccias and lamprophyric rocks have been discovered and sampled by prospectors in the Deadhorse Creek - Killala Lake area, including **Rudy Wahl, Duncan Michano, Peter Moses, Brian Gionet** and **Russel Renner**.

Rudy Wahl has also discovered brecciated lamprophyre and possible kimberlitic rocks in the Heron Bay area, southeast of Marathon (Resident Geologist's Files, Thunder Bay South District, Thunder Bay).

Table 2. Assessment files received in Thunder Bay South in 2000.

Abbreviations

AEM ..... Airborne electromagnetic survey
AM ..... Airborne magnetic survey
ARA ..... Airborne radiometric survey
Beep ..... Beep Mat survey
Bulk ..... Bulk sampling
DD ..... Diamond drilling
DDH ..... Diamond drill hole(s)
DGP ..... Down-hole geophysics
GC ..... Geochemical survey
GEM ..... Ground electromagnetic survey
GL ..... Geological Survey
GM ..... Ground magnetic survey
GRA ..... Ground radiometric survey
Grav ..... Gravity survey
HLEM ..... Horizontal loop electromagnetic survey
HM ..... Heavy mineral sampling
IM ..... Industrial mineral testing and marketing
IP ..... Induced polarization survey
Lc ..... Linecutting
Met ..... Metallurgical testing
OD ..... Overburden drilling
ODH ..... Overburden drill hole(s)
PEM ..... Pulse electromagnetic survey
PGM ..... Platinum group metals
Pr ..... Prospecting
RES ..... Resistivity survey
Samp ..... Sampling (other than bulk)
Seismic ..... Seismic survey
SP ..... Self-potential survey
Str ..... Stripping
Tr ..... Trenching
UG ..... Underground exploration/development
VLEM ..... Vertical loop electromagnetic survey
VLFEM ..... Very low frequency electromagnetic survey

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Adrian Township	Fenwick, K.	1999-2000	DD, Samp	2.20075	52A05/NW
Aldina and Sackville townships	RJK Explorations Ltd.	1999	IP, Str, Samp	2.19834	52A05/NW
Aldina Township	Stares, S.	2000	DD, Samp	2.20314	52A05/NW
Aldina Township and Batwing Lake	Kukkee, R.	1999	Pr, Str, Tr	2.20056	52B08/NE
Baker Township and Miranda Lake	Bjorkman, K.	1998	GEM, GM, GC, GL	2.20221	52B13/SW
Bedivere Lake	Fenwick, K.	2000	DD, Samp	2.20257	52B15/SW
Begin Township	Aho, T.	1998-99	Pr, Tr, Samp	2.20154	52B09/SW
Black Sturgeon Lake	Fleck, R.	1997-99	Pr	2.19695	52H07/NW
Bomby, Brothers and Laberge townships	Lac Exploration Inc.	1999	GC, GL, Samp	2.20174	42C12/NW
Burchell, Crayfish and Kashabowie lakes	Fogen, M.	1999	GL, Str, Samp	2.19934	52B10/NE
Burchell Lake	Kukkee, R.	1999	Pr	2.20349	52B10/SE
Cecil Township	Noranda Inc.	1999	DD	2.19854	42F04/SE
Chief Bay and Lunch Creek	Lac des Iles Mines Ltd.	1998-99	DD, Samp	2.20243	52H06/NE
Coldwell Township	Morgan, J.	1999	DD	Logs donated	42D15/SE

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Coldwell Township	Morgan, J.	1999	GL	2.19836	42D15/SE
Coldwell Township	Morgan, J.	1999	Pr	2.19782	42D15/SE
Coldwell Township	Morgan, J.	1999	Pr	2.19584	42D15/SE
Coldwell Township	Morgan, J.	1999	Pr	2.19835	42D15/SE
Coldwell Township	Morgan, J.	1999	DD	2.19837	42D15/SE
Coldwell Township	Morgan, J.	2000	DD	2.20254/2.20255	42D15/SE
Conacher Township	Band-Ore Resources Ltd.	1999	GL, Samp	2.19654	52B09/NE
Conacher Township	Band-Ore Resources Ltd.	1999	GL, Samp	2.19965	52B09/NE
Conacher Township	Calvert, D.	1999-2000	DD, GEM, GM, Pr	2.20508	52B09/NE
Conmee Township	Clementson, H.	1999	Pr	2.19568	52A05/NE
Conmee Township	Hakala, J.	1998-99	Str, Tr	2.19801	52A05/NE
Crooks and Pardee townships	Falconbridge Ltd.	1998	DD, Samp	2.20258	52A03/SW
Crooks and Pardee townships	Falconbridge Ltd.	1999	IP, GC, GL, GM	2.20065	52A04/SE
Crooks Township	Falconbridge Ltd.	1999	IP, GM	2.19773	52A03/SW
Dawson Road Lots and Horne Township	Kukkee, T.	1998-99	GEM, GM	2.19696	52A12/SW
Devon Township	North Atlantic Nickel Corp.	1999-2000	DD	2.20331	52A04/SE
Dorion Township	Petrunka, D.	1998	Tr, Samp	OP98-034	52A15/SE
Factor and Beaverhouse lakes	Bond II, J.	1999	PEM	2.20501	52C09/SE
Factor and Beaverhouse lakes	Johnson, S.	1999	GEM, GM	2.20353	52C09/SE
Factor, Beaverhouse and Wild Potato lakes	Bond II, J.	2000	AEM, AM	2.20480	52C09/SE
Flood Township	Thorsteinson, E.	2000	Str	2.20452	42C14/SW
Garden Lake	Stares, S. and Stares, M.	1999	DD	2.19849	52H12/SW
Garden Lake	Stares, S. and Stares, M.	1999	DD, Samp	2.20070	52H12/SW
Gorham Township	Pitkanen, R.	1999	Pr, Str, Tr	2.20007	52A11/SW
Hutchinson Township	Wicheruk, M.	1999	GEM, GM, Pr, Tr, Samp	2.20179	52B14/SW
Kabamichigama Lake	Cederwall, N.	1998-99	Str	2.20333	42E04/NE

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Kabamichigama Lake	Paterson, R.	1999	Str	2.20410	42E04/NE
Lac des Iles	Lac des Iles Mines Ltd.	1998	DD	2.20627	52H04/NE
Lac des Iles	Lac des Iles Mines Ltd.	1999	DD, Samp	2.20191	52H04/NE
Lac des Iles	Lac des Iles Mines Ltd.	1999	DD, Samp	2.20022	52H04/NE
Lac des Iles	Lac des Iles Mines Ltd.	2000	DD	2.20384	52H04/NE
Leckie Lake	Avalon Ventures Ltd.	2000	AEM, AM, DD	2.20549	52H02/SW
Lorna and Cirrus lakes	Teck Corporation	2000	GL	2.20505	42D16/SE
Lorna and Cirrus lakes	Teck Corporation, Bond II, J. and Michano, M.	1999	Pr, Tr	2.20485	42D16/SE
Lorna Lake	Bond II, J. and Michano, M.	1998	Pr, Samp	2.20474	42D16/SE
Marks Township	Hakala, J.	1999	Str, Tr	2.19659	52A05/SW
Marks Township	Kukkee, R.	1999	GL, Pr, Str, Samp	2.20027	52A05/SW
McQuat Lake	Stares, S.	2000	GL, Str, Samp	2.20675	52B12/NW
McTavish Township	Bak, D.	1999	Str	2.20190	52A10/NE
McTavish Township	Bak, D.	2000	Str	2.20350	52A10/NE
McTavish Township	Stone, T. and Stone, A.	1999	Str, Samp	2.19935	52A10/NE
McTavish Township	Twomey, T.	2000	Str, Tr	2.20413	52A10/NE
Moss Township	Moss Lake Gold Mines Ltd.	1999	GEM, GM	2.20069	52B10/SE
Moss Township	Moss Lake Gold Mines Ltd.	1999	IP	2.20149	52B10/SE
Moss Township	Moss Lake Gold Mines Ltd.	2000	GL	2.20636	52B10/SE
Moss Township	Pele Mountain Resources Inc.	1997	GC	2.19466	52B10/SW
Moss Township	Pele Mountain Resources Inc.	1997	GL	2.19783	52B10/SW
North of Purdom Township	Fenwick, K.	1999-2000	IP, GM	2.20008	52H01/NW
North of Purdom Township	Fenwick, K.	2000	DD	2.20712	52H01/NW
Norway Lake	Atikokan Resources Inc.	1998-99	DD, Samp	2.19575	52G03/SW

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Norway Lake	Saunders, D.	1999	IP	2.20245	52G03/SW
Orbit and Senga lakes	Lac des Iles Mines Ltd.	2000	GL, Samp	2.20643	52H04/SW
Orbit Lake	Lac des Iles Mines Ltd.	1998	IP, GM	2.20256	52A13/NW
Pardee Township	Luski, M.	1999	Recut lines	2.20177	52A04/SE
Pardee Township	Luski, M.	1999	Samp	2.20242	52A04/SE
Pardee Township	Middaugh, R.	1998-99	GEM, GM	2.20181	52A04/SE
Pearson Township	Chaschuk, M.	1999	DD	2.20414	52A04/NE
Pic Township	Michano, D. and Michano, J.	2000	GL	2.20449	42D09/NW
Pic Township	Teck Corporation	1998	DD, Samp	2.20160	42D09/NE
Pic Township	Wahl, R.	1999	GC	2.20407	42D09/NW
Powell Lake	Koivisto, R.	1998	GM, Pr, Samp	2.19432	52B07/NW
Powell Lake	Kukkee, K.	1998	GM, DD, Samp	2.19431	52B07/NW
Powell Lake	Kukkee, K.	1999	Tr, Samp	2.20334	52B07/NW
Moss Township and Powell Lake area	Pele Mountain Res. Inc.	1997	DD, Samp	2.18952	52B10/SW
Redhorse Lake	Murgor Resources Inc.	1999-2000	GL	2.20457	52C08/NW
Redhorse Lake	Pitkanen, R.	1999	Pr, Samp	2.19661	52C08/NW
Richardson Lake	Douglas, A.	1997	Pr, Samp	2.19567	52C08/NW
Ruffo Lake	King, R.	1998-99	Pr, Samp	2.19464	52H12/SE
Saganagons Lake	Stares, M.	1999	DD	2.20409	52B07/SW
Santoy Lake	Cameco Corporation	1999	GM	2.19933	42D15/NW
Seeley and Lorna lakes	Battle Mountain Canada Ltd.	1999	GC	2.19851	42D16/SW
Seeley and Lorna lakes	Fowler, B.	1999	GC	2.19852	42D16/SW
Seeley Lake	Gryphon Metals Corporation	1999-2000	GL, DD, Samp	2.20412	42D16/SW
Shabotik River	Ternowesky, J. and Cox, W.	1999	GEM, GM	2.19465	42C14/NW
Shabotik River	Ternowesky, J. and Cox, W.	2000	GEM, GM	2.20246	42C14/NW
Sprout Lake and Cockerham Township	Bitterroot Resources Inc.	2000	GM, Grav	2.20196	52H02/NE
Syine Township	Daniels, G.	1999	GL, Pr, Str, Tr, Samp	2.20045	42D15/SW

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Syine Township	Daniels, G.	1999	IP	2.20004	42D15/SW
Syine Township	Wahl, R.	2000	Pr, Str, Tr	2.20309	42D15/SW
Tartan Lake	Grieve, M.	1998	Str, Tr	2.19790	52A10/SW
Tartan Lake	Harty, R.	1998-99	Str	2.19917	52A10/NW
Tartan Lake	Harty, R.	1999	Str	2.20193	52A10/NW
Tartan Lake	Richardson, W.	1998	Str, Tr	2.19430	52A10/NW
Tib and Armistice lakes	Lac des Iles Mines Ltd.	1998-99	GC, Pr, Samp	2.20182	52H05/SW
Tib and Sharp lakes	Lac des Iles Mines Ltd.	1998-99	GC, Pr, Samp	2.20180	52H04/NW
Tib Lake	Fenwick, K.	2000	GL, GM	2.20332	52H04/NW
Tib Lake	Richmond, W.	1999	DD, Samp	2.20176	52H04/NW
Tib Lake	Richmond, W.	2000	GEM, GM	2.20470	52H04/SW
Tilly Lake	Bumbu, C.	1999-2000	DD	2.20340	52B10/SW
Tilly Lake and Moss Township	Bumbu, C.	1999	GEM, GM	2.19896	52B10/SW
Tilly Lake and Moss Township	Bumbu, C.	1999	Pr, Tr, Samp	2.19697	52B10/SW
Titmarsh Lake	de Carle, R.	1998	GC, GL, Pr, Samp	2.19919	52B07/SE
Trottier Township and Eva Lake	Morehouse, W.	2000	Pr, DD	2.20358	52B14/SE
Tuuri Township	Major General Resources Ltd.	1999	IP, GC, GL, PEM	2.20145	42D15/SW
Upper Aguasabon Lake	Richards, W.	1998-99	Pr, Samp	2.20224	42E03/SE
Wabikoba Lake	Teck Corporation	2000	DD	2.20586	42C13/SW
Walsh Township	Major General Resources Ltd.	1999	IP, GM	2.19921	42D15/SW
Walsh Township	McCullough, D.	1997	Pr, Str, Samp	2.19071	42D15/SE
Weaver Township	Morehouse, W.	2000	DD	2.20651	52B14/SE
Weaver Township and Crooked Pine Lake	Eveleigh, A. and Clark, G.	1999	GL, Samp	2.19850	52B14/SE
Wild Potato Lake	Bond II, J.	1998	GL, Samp	2.20498	52C09/NW
Wild Potato Lake	Hexagon Gold (Ont.) Ltd.	1999	DD, Samp	2.20192	52C09/NW
Wolf Lake	Haskell, B.	1999-2000	Pr	2.20415	52A15/NE

Table 3. Exploration activity in the Thunder Bay South District in 2000 (keyed to Figures 1a,b; 2a,b).

Abbreviations

AEM	Airborne electromagnetic survey	IP	Induced polarization survey
AM	Airborne magnetic survey	Lc	Linecutting
ARA	Airborne radiometric survey	Met	Metallurgical testing
Beep	Beep Mat survey	OD	Overburden drilling
Bulk	Bulk sampling	ODH	Overburden drill hole(s)
DD	Diamond drilling	PEM	Pulse electromagnetic survey
DDH	Diamond drill hole(s)	PGM	Platinum group metals
DGP	Down-hole geophysics	Pr	Prospecting
EnvR	Environmental Baseline Study	RES	Resistivity survey
GC	Geochemical survey	Samp	Sampling (other than bulk)
GEM	Ground electromagnetic survey	Seismic	Seismic survey
GL	Geological Survey	SP	Self-potential survey
GM	Ground magnetic survey	Str	Stripping
GRA	Ground radiometric survey	Tr	Trenching
Grav	Gravity survey	UG	Underground exploration/development
HLEM	Horizontal loop electromagnetic survey	VLEM	Vertical loop electromagnetic survey
HM	Heavy mineral sampling	VLFEM	Very low frequency electromagnetic survey
IM	Industrial mineral testing and marketing		

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1.	1349563 Ontario Ltd. (North Elbow Lake Property)	Bedivere Lake area (PGE)	Pr, Samp, Str
2.	Atikokan Resources Inc. (Lumby Lake - Heronstrack Property)	Norway Lake area (Ag, Cu, Zn, Pb)	DD, DGP, IP, Pr, Samp
3.	Aurogin Resources Ltd./ Franco-Nevada Mining Corporation Limited (Parlake Property)	Seeley Lake area (PGE)	AEM, AM
4.	Avalon Ventures Ltd. (Coldwell Property)	McCoy and O'Neill tps.; Seeley Lake area (Rare Metals)	Pr, Samp
5.	Avalon Ventures Ltd. / Starcore Resources Ltd. (Legris Lake Property)	Shelby Lake and Whitefin Lake areas (PGE)	DD, Lc, GL, GC, IP
6.	Bak, D. (Bak Quarry)	McTavish Tp. (Amy)	Str
7.	Baltic Resources Inc. (Pic River Property)	Pic Tp. (Au)	GL, Pr, Samp
8.	Berland Resources Ltd. (Roaring River Property)	Gillard Lake area (PGE, Cu, Ni)	Pr, Samp
9.	Bitterroot Resources Ltd. (Shillabeer Property)	Sprout Lake area and Cockeram Tp. (PGE)	GM, Grav
10.	Breezy Mountain Amethyst Mines Ltd. (Breezy Mountain Mine)	McTavish Tp. (Amy)	Str, Tr
11.	Buck Lake Ventures Ltd. / Pacific Topaz Resources Ltd. (Bo Lake Property)	Armistice Lake area (PGE)	Pr, Samp
12.	Calvert, D. (Shelter Bay Property)	Conacher Tp. (Au)	DD, Pr, GM, GEM
13.	Cameco Gold Inc. (Empress Property)	Syine Tp. (Au)	Pr, Samp, Lc, GM, GL

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
14.	Canadian Golden Dragon Resources Ltd. / Colby Resources Corp. (Grand Bay Property)	Grand Bay (Lake Nipigon) area (PGE, Ni)	IP, Lc, GM
15.	Canadian Golden Dragon Resources Ltd. / East West Resource Corporation (McIvor Property)	McIvor Tp. (PGE)	DD, GM, IP
16.	Canadian Golden Dragon Resources Ltd. / Platinum Group Metals Ltd. (South Legris Property)	Lac des Iles, Max Lake, Shelby Lake, Whitefin lake areas (PGE, Cu, Ni)	GL
17.	Canplats Resources / East West Resource Corporation (Posh Property)	Lunch Creek area (PGE)	Lc, IP, GM, AM
18.	Cassidy Gold Corp. / Gryphon Metals (Thunder Lake)	Adrian Tp. (Cu, Ni, PGE)	Pr, Samp, AEM, AM
19.	DeCarle, R. (Northern Lights Property)	Titmarsh Lake area (PGE)	Pr, Samp
20.	East West Resource Corporation (Havoc Property)	Havoc Lake and English Bay areas (PGE)	Lc, IP, GM, AM, AEM
21.	East West Resource Corporation / Canadian Golden Dragon Resources Ltd. / Avalon Ventures Ltd. (Disraeli - Seagull Property) (*a.k.a.* Wolf Mountain)	Leckie Lake area (PGE, Cu, Ni)	DD, DGP, GM, IP
22.	East West Resource Corporation / Canadian Golden Dragon Resources Ltd. (Little Sturge Property)	Little Sturge Lake area (PGE)	Pr, Samp
23.	East West Resource Corporation / Canadian Golden Dragon Resources Ltd. (Hele Property)	Hele Tp. (PGE)	GL, GM (Remnant Mag.)
24.	East West Resource Corporation / Canplats Resources (Mikinak Property)	Mikinak Lake area (PGE)	IP, Lc
25.	Fort Knox Gold Resources Inc. (Chief Peter Property)	Bedivere Lake area (PGE)	DD
26.	Fort Knox Gold Resources Inc. (Dog River Property)	Tib Lake area (PGE)	GL, GM
27.	Fox Mountain Explorations Ltd. / Eclipse Mining Corporation (Disraeli Lake Property)	Leckie Lake area (PGE)	Pr, Samp
28.	Freewest Resources Canada Inc. (Bermuda Property)	Seeley Lake area (PGE)	Str, GL, Samp, IP
29.	Freewest Resources Canada Inc. (Moshkinabi Property)	Roberta and Herbert tps. (PGE, Cu, Ni)	Pr, Samp, Tr
30.	Freewest Resources Canada Inc. (Mealy-Goodchild Property)	Lorna Lake and Cirrus Lake areas (PGE, Cu, Ni)	Pr, Samp
31.	Freewest Resources Canada Inc. / Cassidy Gold Corp. / Gryphon Metals Corporation (Jembi - Bulldozer Property)	Shabotik River area (PGE, Cu, Ni)	AEM, GL, Pr, Samp
32.	Freewest Resources Canada Inc. / Sparton Resources Inc. (Tyko Lake Property)	McGill Tp. (PGE, Cu, Ni)	AEM, AM, Pr, samp, IP

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
33.	Geomaque Explorations Ltd. / PolyMet Mining Corp. (Marathon Property)	Seeley Lake area (PGE, Cu, Ni)	Compilation
34.	Gilbert, W. & Gillis, D. (Block Creek Property)	Whitefin Lake and Max Lake areas (PGE)	Pr, Samp
35.	Gionet, G. & M. (Rawluk Lake Property)	Cecil Tp. (PGE, Cu, Ni)	Pr, Samp, Tr, Str, Beep
36.	Gionet, G. & M. (Faries Lake Property)	Cecil Tp. (Cu, Zn; Ni, PGE)	Pr, Samp, Tr, Str, Beep
37.	GoldSat Mining Inc. (Garden Lake Property)	Garden Lake area (PGE, Au, Cu, Ni)	Pr, Samp
38.	Gryphon Metals Corporation (Bulldozer Lake Property)	Shabotik River area (PGE)	GM, GEM
39.	Hackl, J. & J. (Peninsula Property)	Haines Tp. (PGE, Cu, Ni)	Pr, Samp
40.	Haskell, K. (Wolf Lake Property)	Wolf Lake area (PGE)	Pr, Samp
41.	Hietapakka, R. and Stevens, D. (Fat Beagle Property)	Max Lake area (Au)	Pr, Samp
42.	Houston Lake Mining Inc. (Tib Lake Property)	Tib Lake area (PGE)	DD, GL, Samp, Pr, IP, GM, Lc
43.	International Northair Mines Ltd. (Selby Property)	Tib Lake area	Pr, Samp
44.	L.E.H. Ventures Ltd. / Gryphon Metals Corporation / Coubran Resources Ltd. (Geordie Lake Property)	Seeley Lake area (PGE)	DD, Met
45.	Lac des Iles Mines Ltd. (Wakinoo Lake Property)	Orbit Lake and Senga Lake areas (PGE)	GL, Samp
46.	LMX Resources Ltd. (Faries - Rawluk Lake Property)	Cecil Tp. (PGE)	Pr, Samp
47.	LMX Resources Ltd. / Classic Gold Resources Limited (Haines Gabbro property)	Haines Tp. (PGE, Cu, Ni)	Samp, UTEM, Str, Pr, GM
48.	LMX Resources Ltd. / Buck Lake Ventures Ltd. (Buck Lake Property)	Senga Lake area (PGE)	Str, Samp, GL, Tr, GC, IP, GM, Pr
49.	McVicar Minerals Ltd. / BHP World Exploration Inc. (Muskrat Property)	Little Sturge Lake area (PGE)	Pr, Samp
50.	McVicar Minerals Ltd. / East West Resources Corporation (Spruce River)	Little Sturge Lake area (PGE)	Pr, Samp
51.	Michano, D., Gionet, B. & Wahl, R. (Foxtrap Creek Property)	Foxtrap Lake and Killala Lake areas (Diamonds, Rare Earth Elements)	Pr, Samp
52.	Michano, D., Moses, P., Gionet, B. & Wahl, R. (Islington and Upper Deadhorse properties)	Foxtrap Lake and Killala Lake areas (Diamonds, Rare Earth Elements)	Pr, Samp
53.	Michano, D., Renner, R., Moses, P. & Wahl, R. (Dead Horse Creek Property)	Foxtrap Lake and Killala Lake areas (Diamonds, Rare Earth Elements)	Pr, Samp

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
54.	Morehouse, W. (Elbow Lake Property)	Trottier Tp. And Eva Lake area (PGE)	DD, Pr, Samp
55.	Morehouse, W. (Mud Lake Property)	Weaver Tp.	DD
56.	Morgan, J. (Coldwell Property)	Coldwell Tp. (Stone)	DD
57.	Moses, P. (Larry Lake Property)	Santoy Lake area (Cu, Zn, Au)	Pr, Samp
58.	Moss Lake Gold Mines Ltd. (Moss Lake Property)	Moss Tp. (Au)	GL, Samp
59.	Murgor Resources Inc. (Redhorse Lake Property)	Redhorse Lake area (PGE)	GL, Samp
60.	New Millennium Metals Corp. / East West Resource Corporation / Maple Minerals Ltd. (Lac des Iles River Property)	Shelby Lake area (PGE)	Tr, Pr, Samp, IP, GM, Lc
61.	New Millennium Metals Corp. / Canadian Golden Dragon Resources Ltd. (Ottertooth Property)	Obonga Lake area (PGE)	GL, Pr, Samp
62.	New Millennium Metals Corporation (Taman Lake Property)	Senga Lake area (PGE)	GL, Pr, Samp, Tr, Str
63.	New Millennium Metals Corporation (Tib Lake Property)	Tib Lake area (PGE)	Pr, Samp, GL
64.	New Millennium Metals Corporation / East West Resources Corp. (Ottertooth Property)	Whalen Lake and Puddy Lake areas (PGE)	Pr, Samp
65.	North American Palladium Ltd. (Lac des Iles Mine Property)	Lac des Iles area (PGE, Cu, Ni)	DD, GL, Str, Samp, Pr
66.	North American Palladium Ltd. (Buck Lake Property)	Tib Lake area (PGE)	GL, Pr, Str, Samp
67.	North Atlantic Nickel Corp. (Blake Property)	Devon and Pardee tps. (Cu, Ni, PGE)	DD
68.	Platinum Group Metals Ltd. / East West Resource Corporation (Pebble Property)	Circle Lake area (PGE)	GL
69.	Prism Resources / Canplats Resources East West Resource Corporation (Plateau Property)	McAlpine Lake area (PGE)	Lc, IP, GM, Tr, Samp
70.	Prism Resources / Canplats Resources East West Resource Corporation (Stawson Property)	McOuat Lake area (PGE)	GL, Str, Samp
71.	Renner, R. & Wahl, R. (Foxtrap and Deadhorse properties)	Foxtrap Lake and Killala Lake areas (Diamonds, Rare Earth Elements)	Pr, Samp
72.	Richards, W. (Harvie Creek Property)	Lower Aguasabon Lake area (Au)	Pr, Samp
73.	Richmond, W. & Morehouse, W. (Mirage Lake Property)	Mooseland Lake & Sharp Lake area (PGE)	Pr, Samp
74.	RJK Explorations Ltd. / Greater Lenora Resources Corp. (Stares-Calvert Property)	Aldina Tp. (Cu, Zn, Pb, Ag)	DD, Str, Tr, Samp, Lc, IP, GM, GL

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
75.	RJK Explorations Ltd. / Greater Lenora Resources Corp. (Rockstone Lake Property)	Adrian Tp. (Au, Cu, Zn)	DD
76.	Ruby Lake Marble Ltd. (Ruby Creek Property)	Corrigal Tp. (Stone)	Str, Samp, Pr
77.	Ruby Lake Marble Ltd. (Ruby Lake Quarry)	Corrigal Tp. (Stone)	Str, Samp, Pr
78.	Starcore Resources Ltd. / ProAm Explorations Corporation / Pacific Ridge Exploration Ltd. (Samuels Lake Property)	Factor Lake and Beaverhouse Lake areas (PGE)	AEM, AM, Str, Samp
79.	Starcore Resources Ltd. / ProAm Explorations Corporation (Harnett Lake Property)	Factor Lake area (PGE)	AEM, AM
80.	Starcore Resources Ltd. / ProAm Explorations Corporation (Whalen Lake Property)	Wild Potato Lake area (PGE)	AEM, AM
81.	Starcore Resources Ltd. / ProAm Explorations Corporation (Surprise Lake Property)	Factor Lake area (PGE)	AEM, AM
82.	Tandem Resources Ltd. (Tilley Creek Property)	Tilly Lake area	DD
83.	Teck Corporation (White River Property)	Laberge and Brothers tps. (Au)	GL, GC, DD
84.	Teck Corporation (Stenlund - Heron Bay Property)	Pic Tp. (Au)	DD
85.	Teck Corporation (Toothpick East Property)	Pic Tp. (Au)	DD
86.	Teck Corporation (Goodchild Property)	Lorna Lake area (Au)	GL, IP, GM, VLF-EM, Samp
87.	Teck Corporation (Rous Lake Property)	Lecours Tp. (Au)	DD
88.	Teck Corporation (Schreiber Property)	Upper Aguasabon Lake area (Au)	GL, Pr, Samp
89.	Thorsteinson, E. (Flood Property)	Flood Tp. (Au)	Str
90.	Viitala, R. & Irwin, J. (Crooks Property)	Crooks Tp. (PGE, Cu, Ni)	Pr, Samp
91.	Voyager Explorations Limited (Pic Property)	Pic Tp. (PGE)	Pr, Samp, GM
92.	Voyager Explorations Limited (Pardee Property)	Pardee Tp. (PGE, Cu, Ni)	Pr, Samp
93.	Wahl, R. (Heron Bay Property)	Pic Tp. (Diamonds)	Pr, Samp
94.	Wahl, R. and Daniels, G. (Danwahl Property)	Syine Tp. (Au)	Pr, Str, Samp
95.	Wallenius, B. & W. (Arrow River Property)	Devon Tp. (PGE, Cu, Ni)	Pr, Samp

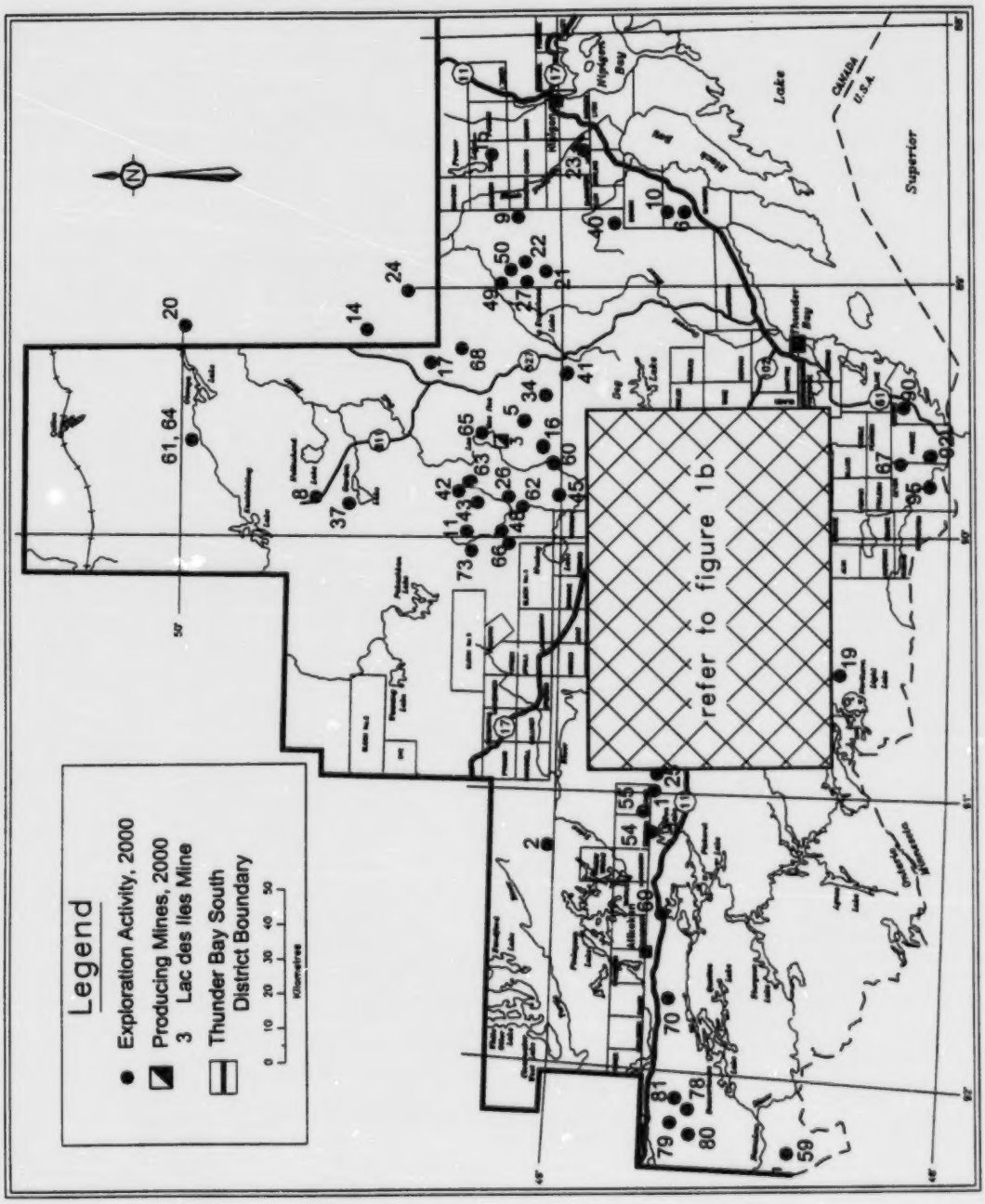

Figure 1a. Thunder Bay South Resident Geologist's District, (western portion), Exploration Activity, 2000.

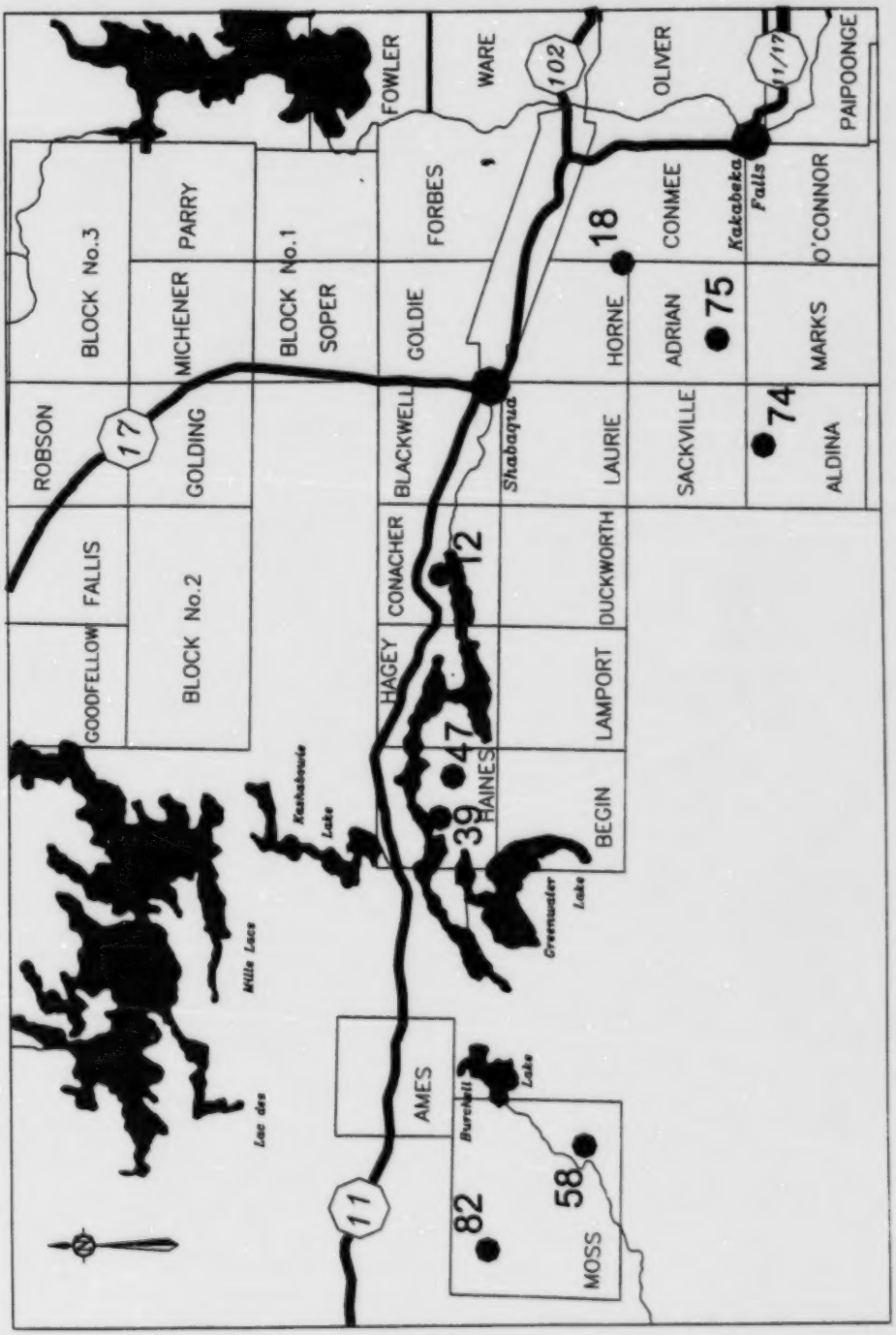

Figure 1b. Thunder Bay South Resident Geologist's District, (Shebandowan area), Exploration Activity, 2000.

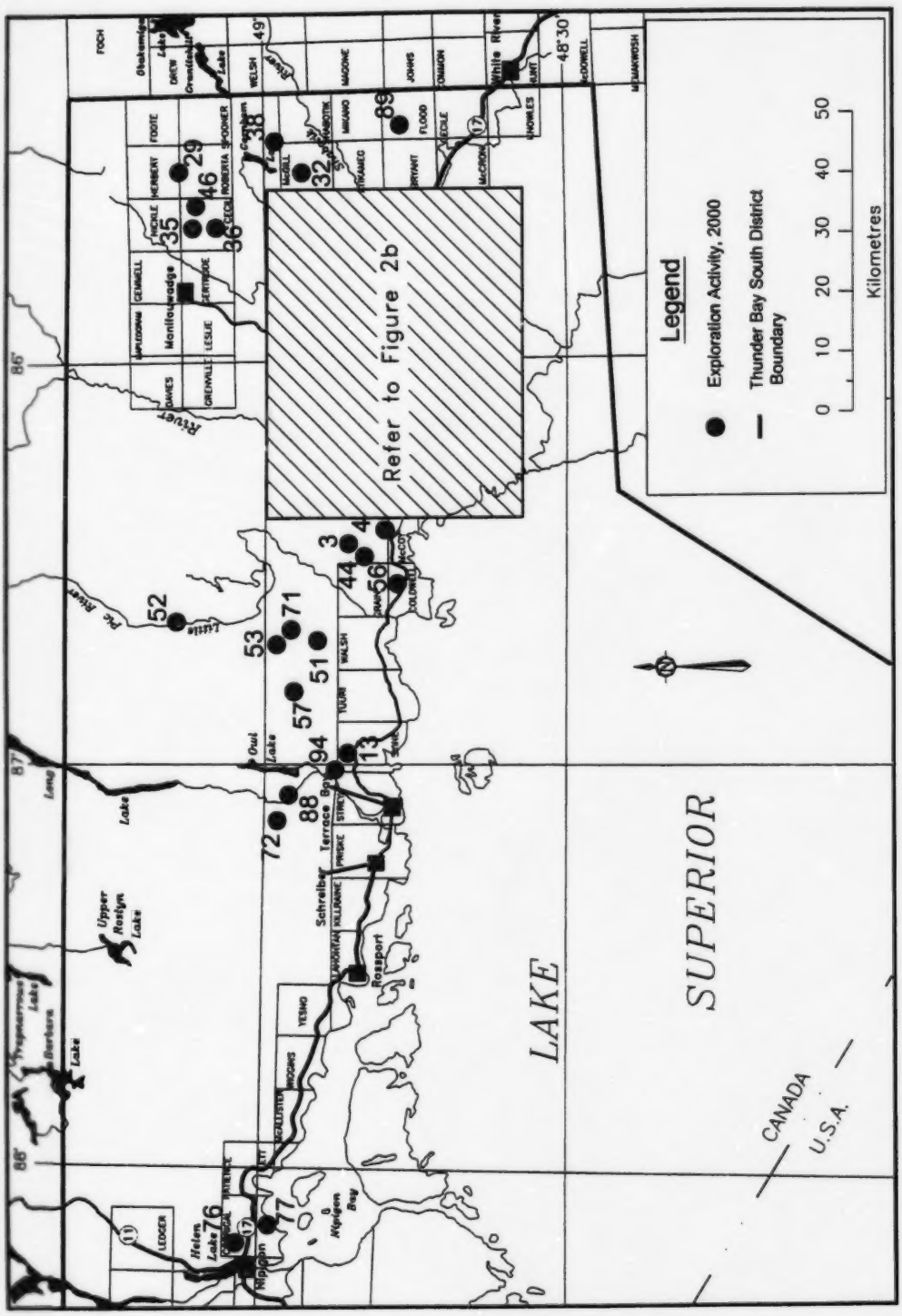

Figure 2a. Thunder Bay South Resident Geologist's District, (Schreiber-Hemlo portion), Exploration Activity, 2000.

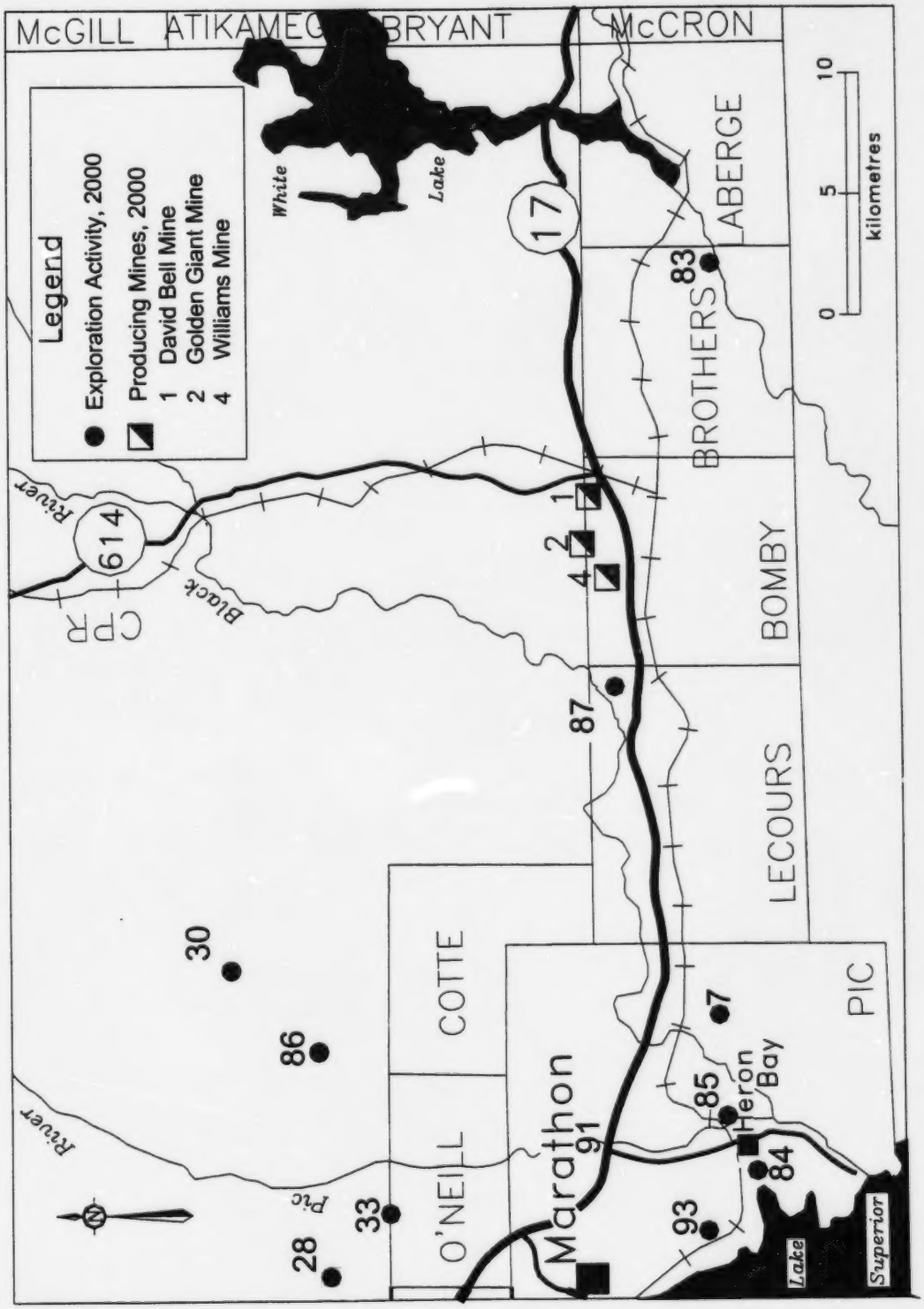

Figure 2b. Thunder Bay South Resident Geologist's District, (Hemlo area), Exploration Activity, 2000.

LAND USE PLANNING ACTIVITIES

Staff of the Thunder Bay South District were involved with many aspects of the *Ontario's Living Legacy* initiative in 2000, including preparing discussion papers and mineral resource assessments for designated and candidate provincial parks and conservation reserves, as well as the Great Lakes Heritage Coast. Several municipal plans and forest management plans were also reviewed. M.C. Smyk represented the Northwestern Ontario Prospectors Association on the Regional Committee for the proposed National Marine Conservation Area (NMCA) in western Lake Superior.

Additional information regarding Land Use Planning activities is provided in the report of the Regional Land Use Geologist - Northwest (this report).

RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

The Thunder Bay South District is staffed by B.R. Schnieders, Regional Resident Geologist, J.F. Scott and M.C. Smyk, District Geologists and M.S. O'Brien, Regional Support Geologist. J. Stewart assumed the position of District Support Geologist in 2000, replacing A. Lichtblau. During 2000, the Thunder Bay South Resident Geologist Program (RGP) dealt with more than 4200 inquiries from the mining sector, other government agencies, and the general public. Bi-weekly visits were made to the Marathon satellite office from May until October, usually on Tuesday afternoons. Service was also provided to clients in the Thunder Bay Drill Core Library, as well as the remote core storage facilities in Conmee Township (30 km west of Thunder Bay) and in Marathon.

RGP staff completed 94 visits to 79 properties in 2000 (Table 4, Figures 3a,b). Twenty-three field trips were conducted or attended. Four poster displays were assembled and manned at the Northwestern Ontario Mines and Minerals Symposium in Thunder Bay, the Prospectors and Developers Association of Canada convention in Toronto, and at other various open houses and conferences. Seven technical presentations were delivered. Logistical support and field assistance were given to both Ontario Geological Survey and Geological Survey of Canada geoscientists conducting field work in the Thunder Bay South District.

R. Tuomi, Data Compilation Geologist, Thunder Bay, and RGP staff edited 221 Mineral Deposit Inventory (MDI) records in 2000. This included fixing errors created during the MDI1 - MDI2 data conversion; adding and deepening the data for past producing and producing mines; and entering data from Open File Report compilations.

B.R. Schnieders and J.K. Mason attended the 2000 Cordilleran Round-Up held in Vancouver, B.C. A booth, filled with display material, handouts, recommendations, cut and polished rock slabs, drill core and promotional materials, was manned. Commodities, such as PGE, rare metals, diamonds, base metals and *Ontario Treasure Hunt* products, were highlighted. The response from the symposium was overwhelming; many Ontario properties were optioned and staked as a result.

B.R. Schnieders was a member of the Black Sturgeon 2001-2021 Forest Management Plan Planning Team. M.C. Smyk served on the Goldich Medal Committee of the Institute on Lake Superior Geology (ILSG), on the organizing committee for the 46th ILSG meeting (2000), on the Regional Committee for the proposed Lake Superior National Marine Conservation Area (NMCA), and as a core member of the Pukaskwa National Park Regional Communication Group. J.F. Scott was actively involved in the application of Global Positioning System (GPS) technology (*e.g.* property, road, detailed grid, stripped area, and air photo base maps). RGP staff assisted with the 46th ILSG, Mines and Minerals Symposium, PDAC and numerous field trips and company consultations and orientations. RGP staff made numerous recommendations to other branches of the Ontario Geological Survey regarding PGE compilation studies, as well as geochemical soil and till sampling programs in the district.

Table 4. Property visits conducted by the Thunder Bay South Regional Resident Geologist and Staff in 2000.

Number (keyed to Figures 3a,b)	Property/Occurrence
1.	Adrian Township[R]
2.	Aldina - Marks Townships[R]
3.	Amethyst Mine Panorama
4.	Bateman Lake
5.	Bermuda[R,PE]
6.	Black Sturgeon Lake
7.	Blueberry Amethyst Patch
8.	Boreal Road Area (Aldina-Sackville Twps.)[R]
9.	Boswell's Point
10.	Buck Lake
11.	Burnt Island
12.	Caldwell Island
13.	Calvert Float / Stares Float (Aldina)[R, PE]
14.	Camp 42
15.	Camp 517 Road
16.	Caribou Mine
17.	Cloud Bay Mine
18.	Coldwell Complex Quarries[FT]
19.	Crystal Creek Amethyst Mine
20.	Dead Horse Road
21.	Echo Lake Amethyst
22.	Edward Island
23.	Empress / Empress East
24.	Eva Lake[R]
25.	Frazer-Krug Lakes area
26.	Geco - Willroy Mines[FT]
27.	Geordie Lake
28.	Gold Range[FT]
29.	Golden Giant Mine
30.	Great Lakes Nickel[R]
31.	Gunflint[FT]
32.	Gut Point
33.	Hakala-Holbik "PGE"
34.	Hardtack-Finlayson Lakes
35.	Heitapakka (Jean Township)
36.	Hele Township[R]
37.	Hemlo Highway Section[FT]
38.	Heron Bay[FT]
39.	Jackfish / Terrace Bay Batholith[FT]
40.	Jarvis
41.	Kakabeka Falls conglomerate
42.	Legris Lake
43.	Little Trout Bay[R]
44.	Lumby Lake Area
45.	Marathon Deposit
46.	Max Lake
47.	Mocan Valley / Danwahl
48.	Morehouse Breccia Zone
49.	Morley Pyrite[FT]

Number (keyed to Figures 3a,b)	Property/Occurrence
50.	Moshkinabi Lake
51.	Nym Lake[R]
52.	Pass Lake - Pearl Area[FT]
53.	Pays Plat
54.	Pete's Lake
55.	Pie Island
56.	Powder Hill / Turtle Hill / Stocker Zone
57.	Prince Mine
58.	Ruby Lake Quarry[FT]
59.	Samuels Lake[R]
60.	Schreiber Highway[FT]
61.	Selim Siding (Zenmac Mill Site)
62.	Shack Lake
63.	Shelby Road Area
64.	Silver Islet
65.	Slate Islands
66.	Slate River - Mount Mollie[R]
67.	Smoke Lake
68.	South McKellar Island[R]
69.	Spar Island[R]
70.	Sturgeon Point[R]
71.	Tessier Williamson
72.	Thompson Island[R]
73.	Thunder Bay Agate Mine
74.	Victoria Lake
75.	Williams Mine
76.	Winston Lake Mine[FT]
77.	Wire Lake[FT]
78.	Wolf Mountain
79.	Wullie Lake[R]

[R] *described in RECOMMENDATIONS FOR EXPLORATION, this report*

[PT] *described in PROPERTY EXAMINATIONS, this report*

[FT] *visited during field trip conducted by Resident Geologist's staff in 2000*

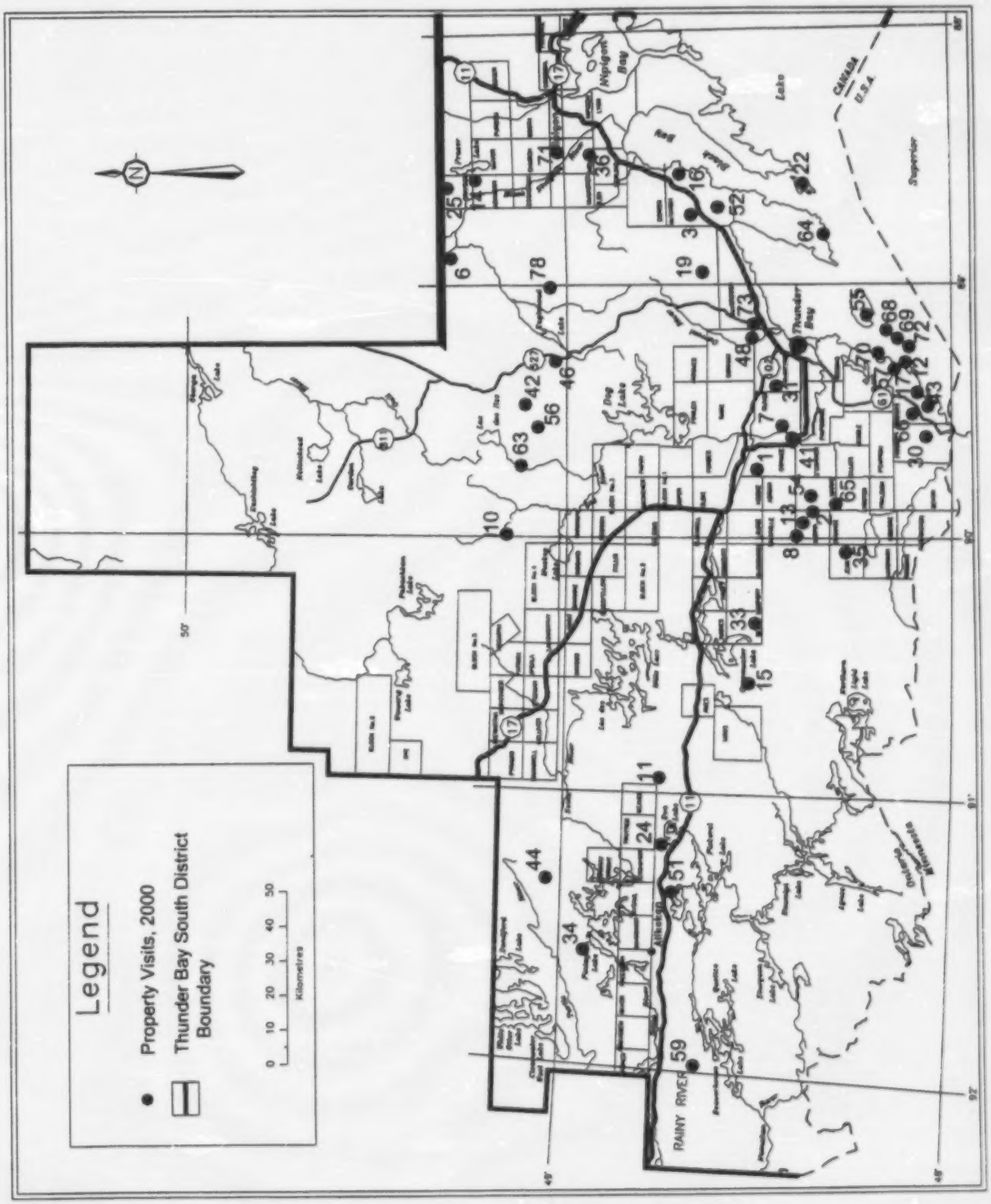

Figure 3a. Thunder Bay South Resident Geologist's District, (western portion), Property Visits, 2000.

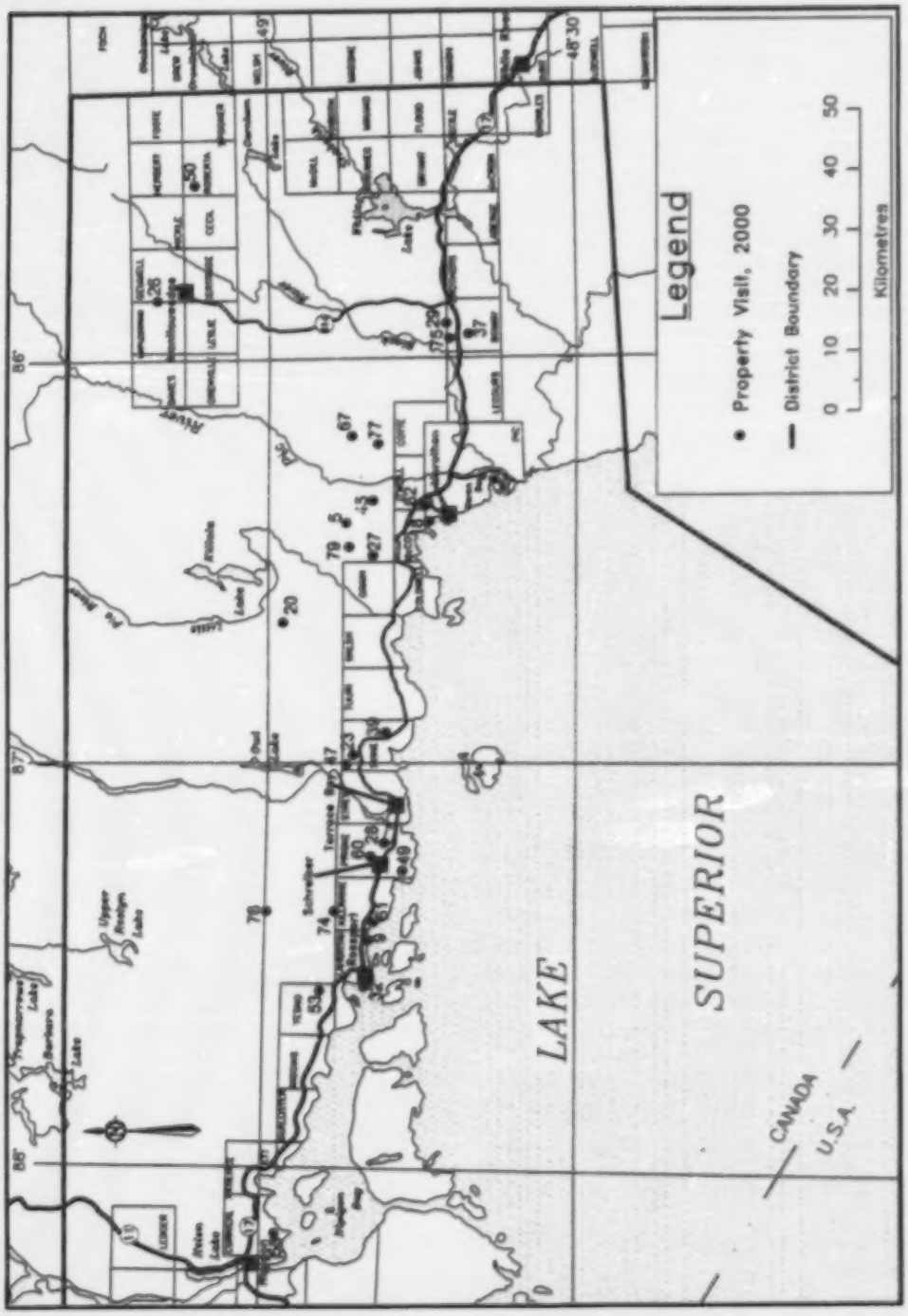

Figure 3b. Thunder Bay South Resident Geologist's District, (Schreiber-Hemlo portion), Property Visits, 2000.

PROPERTY EXAMINATIONS

Calvert Float (Stares/Calvert Property, Aldina Township)

Several new float boulders were discovered by Dan Calvert, prospector, in Aldina Township, approximately 45 km west of Thunder Bay. His property is part of the larger, Stares/Calvert property (Figure 4) optioned by Greater Lenora Resources Corp. and RJK Explorations Ltd. (World Wide Website, http://www.kasnergroupco.com). The most impressive float boulder is the Calvert float; it is 3.05 m by 2.04 m by 1.70 m in size. It was found at UTM coordinates 16U 0282695/5362866. The Calvert float, estimated to weigh between 10 and 15 tonnes, was transported to Lakehead University, where it now resides.

This subangular to subrounded float boulder contains stringer and massive sulphides, including sphalerite, pyrite, galena and chalcopyrite. The sulphides are hosted by grey, siliceous, sericite schist. They vary from fine-grained sphalerite and pyrite to coarser-grained (recrystallized?) pyrite, sphalerite and galena. The coarser-grained galena and pyrite seem to be preferentially developed along foliation planes. Certain sections of the float boulder display banded, massive sulphides in fragment-rich, sericitic schist. A 2 m chip sample (00 BDC-4A) taken across schistosity assayed 6.48% Zn, 8734 ppm Pb, 808 ppm Cu, 127 ppm Ag and 1159 ppb Au (Resident Geologist's Files, Thunder Bay South District, Thunder Bay). Selected grab samples (00 BDC-4B, -4C, -4D) assayed up to 25.21% Zn (30.01% Zn *checked*), 4204 ppm Cu, 949 ppm Pb, 90 ppm Ag and 1720 ppb Au (*ibid*). The samples were assayed at Accurassay Laboratories in Thunder Bay. Complete assay data are given in the table below:

Sample Number	Gold (ppb)	Zinc (%)	Lead (ppm)	Copper (ppm)	Silver (ppm)	Sample Description
00BDC-4A	1159	6.48	8734	808	127	2 m chip sample across schistosity of float
00BDC-4B	1197	18.87	765	4204	75	Selected grab sample, massive sulphide float
00BDC-4C	1720	16.29	949	3000	90	Selected grab sample, massive sulphide float
00BDC-4D	638	25.21	331	1992	81	Selected grab sample, massive sulphide float
00BDC-4D (*check*)	742	30.01	330	1996	60	Selected grab sample, massive sulphide float

Additional boulders of angular float were discovered in the area. The Boomer float, which is a 1.90 m by 1.70 m by 1.15 m float of massive sulphides, consists predominantly of banded pyrite in a sericitic matrix. It is located at UTM coordinates 16U0282549/5362613, approximately 200 m southwest of the Calvert float. Samples collected by D. Calvert assayed up to 0.56% Zn and 0.39% Pb, and samples collected by the staff of the Resident Geologist Program assayed up to 1.29% Zn and 0.12% Pb (Resident Geologist's Files, Thunder Bay South District, Thunder Bay). Several large, angular boulders of pyritic, sericite schist and quartz-phyric, felsic metavolcanic rock were also observed in the area.

The Stares float, located approximately 1.6 km to the northeast of the Calvert float, displayed similar mineralization (Lavigne and Scott 1996) and was the focus of exploration by Cumberland Resources Ltd. as well as Greater Lenora Resources Corp. and RJK Explorations Ltd. To date, geological mapping, trenching, IP and ground magnetometer surveys, and 25 diamond drill holes have been completed in the area of the Stares float. Although sericitic metavolcanic rocks with anomalous zinc have been discovered, the bedrock source of the float has not yet been found.

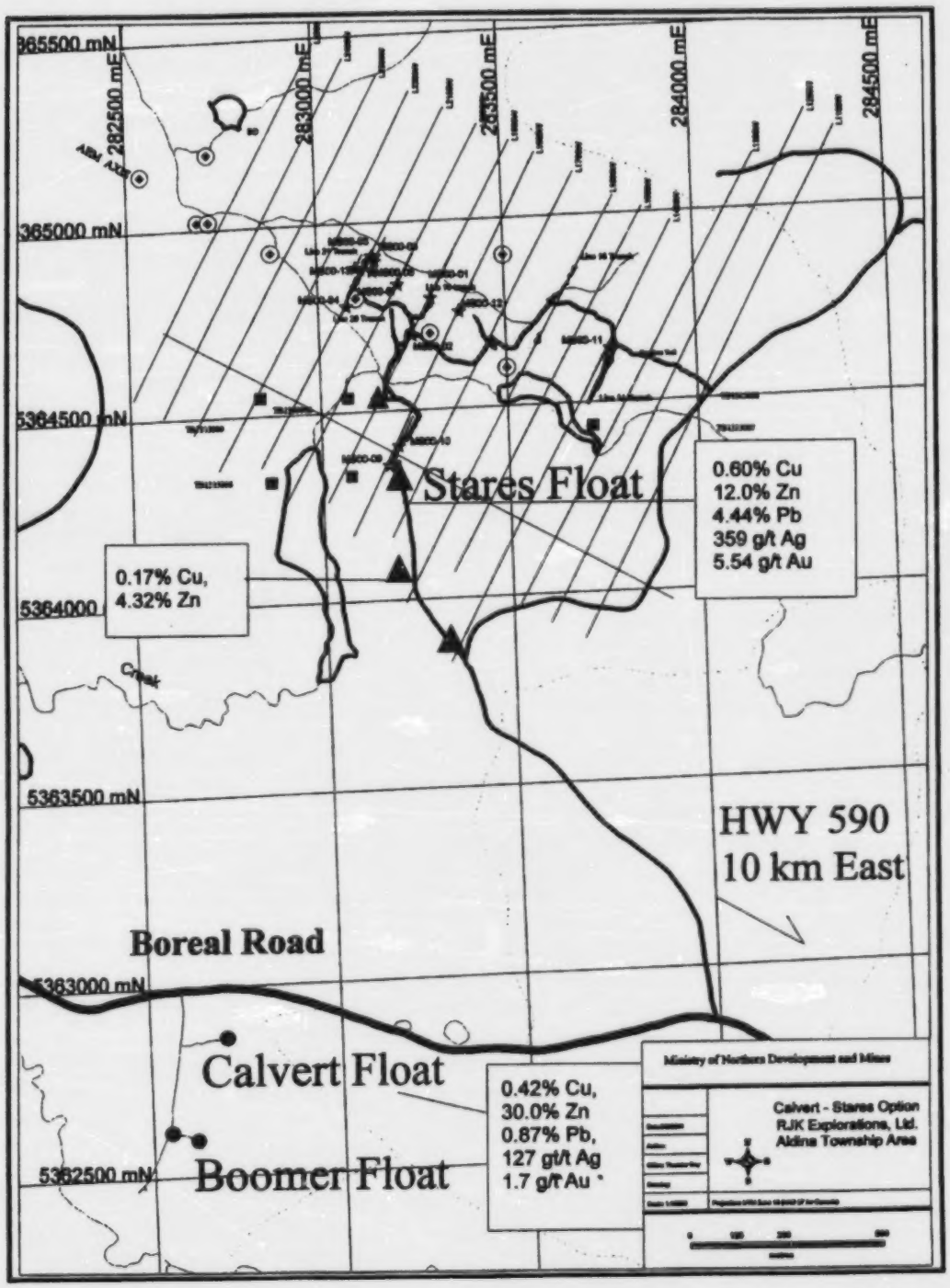

Figure 4. Stares / Calvert Property, Aldina Township.

Recent stripping on Line 21 and Line 17 (375m N) has uncovered felsic, fragmental metavolcanic rocks. These quartz-feldspar-porphyritic rocks contain lapilli-sized fragments and quartz eyes that appear stretched or flattened, with aspect ratios of up to 4:1. The fragmental rocks contain clasts of siliceous, cherty material, which might represent an exhalative cap rock. Drill hole MS00/03 on Line 2100W intersected 0.75 m of brecciated, cherty tuffite containing minor pyrite, pyrrhotite, chalcopyrite and sphalerite (RJK Explorations Ltd./Greater Lenora Resources Corp., Joint News Release, February 15, 2000). Fragmental, felsic metavolcanic rocks and disseminated and stringer sulphides have been observed on Line 1700W, Line 2100W, and in diamond drill core on Line 3200W. It is also interesting to note that large (1 m by 1 m) float boulders containing stretched clasts and lapilli tuff were also noted in close proximity (less than 3 m) to the Calvert float. RJK Explorations Ltd. has suggested a direct relationship between the felsic fragmental unit and the mineralized float boulders (*Canada Stockwatch*, November 8, 2000).

The felsic and mafic metavolcanic rocks display some evidence of hydrothermal alteration. Probable alteration minerals include sericite, biotite, garnet and sulphides; there is also evidence of silicification. Whole-rock and trace element analyses of the metavolcanic rocks were conducted by staff of the Resident Geologist Program and also compiled from previous drilling by Cumberland Resources Ltd. Minor sodium depletion and potassium enrichment is present in the Line 1700, Line 1900 and Line 2300 areas. Sodium values were as low as 0.63% Na_2O and potassium values ranged as high as 7.48% K_2O. Silica values in the felsic metavolcanic rocks range from 66% to 87.03% SiO_2, suggesting the presence of some cherty and/or possibly silicified units. Alumina ranges from 8.27% to 17.80% Al_2O_3 for local felsic metavolcanic rocks. In addition to zinc, lead, silver and copper enrichment in samples, several additional trace elements also appear enriched in the felsic metavolcanic rocks; these include barium (382 ppm Ba) and cadmium (204 ppm Cd). A comparison of whole-rock and trace element data from the felsic metavolcanic rocks found on the property and selected float boulders found in the glacial dispersal train, suggest that the Calvert and Stares float boulders and associated felsic metavolcanic boulders are likely from the main felsic horizon found on the property.

A follow-up till sampling program was recommended to the Sedimentary Geoscience Section, Ontario Geological Survey by the staff of the Resident Geologist Program. A. Bajc, Sedimentary Geoscience Section, identified a well-defined, 2 km long, glacial dispersal train, elevated in base metals as well as several volcanogenic massive sulphide (VMS) indicator elements (*Canada Stockwatch*, December 20, 2000). Work by Bajc (in progress) also suggested that the float source is local, and likely within the main felsic unit.

While debate continues as to whether the Stares/Calvert property represents a true volcanogenic massive sulphide target or rather a polymetallic replacement or vein-type deposit, there is no arguing that there have been several very large and impressive ore grade float boulders found in the Aldina Township area. It also appears from the outcrops and geophysical surveys that the area has undergone extensive folding, faulting, stretching and flattening, and possible thrust stacking. Sulphides may have been remobilized along folds, faults and foliation. North-northeast- and west-northwest-plunging mineral lineations and crenulation cleavage have been measured. This suggests that the massive sulphide target might be in the shape of a plunging lens or rod, following a fold lineation. It is also possible that the metavolcanic rocks are folded around a felsic intrusive body, or that a high level intrusive rock intrudes the package in the Line 1900/ 200 m N area. This is postulated from field investigations and from magnetometer survey interpretation.

RJK Explorations Limited and Greater Lenora Resources Corp. conducted linecutting, prospecting, sampling, detailed magnetometer and induced polarization (IP) geophysical surveys, and diamond drilling in 2000. The Line 1700 and Line1800W, 400 to 500 m north area is a target area; it hosts geophysical anomalies, felsic fragmental rocks and sulphide mineralization. It is situated along the presumed extension of the float dispersal train.

Lac des Iles River Property: Powder Hill and Stocker Zones

New Millennium Metals Corporation, who have staked and optioned numerous PGE properties in Ontario, made significant discoveries on several of these properties in 2000 (World Wide Website, http://www.pgmexplore.com). Their Lac des Iles Project covers the Lac des Iles River property (optioned from East West Resources Corp. and Maple Minerals Inc.) that hosts the Powder Hill, Northeast Powder and Stocker zones, and an adjacent property, a joint venture with New Claymore Resources Ltd. that hosts the Turtle Hill occurrence (*ibid*; World Wide Website, http://www.newclaymore.com). It also encompasses New Millennium's Dog River, Taman, Buck Lake, Tib Lake, Shelby Lake and Demars/Wakinoo properties.

The Lac des Iles River and New Claymore properties were visited by Resident Geologist Program staff as well as A. Bajc, Sedimentary Geoscience Section, OGS. They are located approximately 80 km northwest of Thunder Bay in the Orbit Lake area. Access is gained via the Shelby Lake road, northeast from the Dog Lake Road. Supracrustal country rocks occur within the Wabigoon Subprovince, near the Quetico Subprovince boundary. A major, northeast-trending fault, likely a splay off of the Quetico Fault, is very close to the southern margin of the properties. The Towle Lake and Shelby Lake intrusions appear to represent the southern extension or "tail" of the Lac des Iles complex (Figure 5).

The Powder Hill Zone (UTM coordinates 16U 0301388/5431976) is hosted by the Lac des Iles River intrusion. New Millennium has conducted overburden stripping to expose bedrock. The showing consists of a magmatic breccia, consisting of mafic to ultramafic fragments in a gabbro/hornblendite matrix. The matrix-supported breccia has fragments and blocks of pyroxenite, caught up with metasedimentary rock xenoliths. A fault is postulated in this area. The fragments display chloritic and biotitic alteration, as well as possible reddish-brown iddingsite (a mixture of silicate minerals rich in iron, calcium and magnesium, likely produced from the breakdown of olivine). It commonly forms rust-coloured patches in these mafic rocks. Pyrrhotite and chalcopyrite are disseminated throughout the outcrops. Grab samples collected by New Millennium assayed up to 2.8 g/t Pt+Pd+Au (D. Wagner, New Millennium Metals Corporation, personal communication, 2001).

At the Powder Northeast occurrence, located 320 m east-northeast of the Powder Hill occurrence, rusty, hornblende-rich gabbro was also noted. Sections of the gabbro appeared feldspar-rich, approaching an anorthositic gabbro. Metasedimentary rocks striking 66° are in contact with the mafic intrusive rocks. A grab sample collected by staff of the Resident Geologist Program from this area assayed 330 ppb Pd, 99 ppb Pt and 33 ppb Au (Resident Geologist's Files, Thunder Bay South District, Thunder Bay).

The Stocker Zone, located 600 m northeast of the Powder Hill Zone, near km 27 on the Shelby Lake road, is situated on the western margin of the Towle Lake intrusion (coordinates 16U 0303152/5435581). Prospectors discovered numerous boulders of varied-textured gabbro with pyroxenite xenoliths. The matrix is medium- to coarse-grained gabbro, mineralized with pyrrhotite, pyrite and chalcopyrite. Large, angular float boulders (up to 2m by 2m by 2m) were noted. The density, number and angularity of the boulders support a proximal bedrock source. Grab samples of the mineralized float boulders collected by New Millennium assayed up to 2.2 g/t Pd+Pt+Au (D. Wagner, New Millennium Metals Corporation, personal communication, 2001). Samples collected by staff of the Resident Geologist Program assayed up to 1258 ppm Cu, 399 ppm Ni, 584 ppb Pd, 116 ppb Pt and 18 ppb Au (Resident Geologist's Files, Thunder Bay South District, Thunder Bay). New Millennium has uncovered a bedrock occurrence (Turtle Hill) of pyrite-chalcopyrite-mineralized, hornblende gabbro on the northern margin of the Towle Lake intrusion. Stripping and sampling was ongoing at the time of examination.

New Millennium Metals Corporation had active PGE exploration programs in 2000 on the Shelby Lake, Taman Lake, East Dog, and Ottertooth properties.

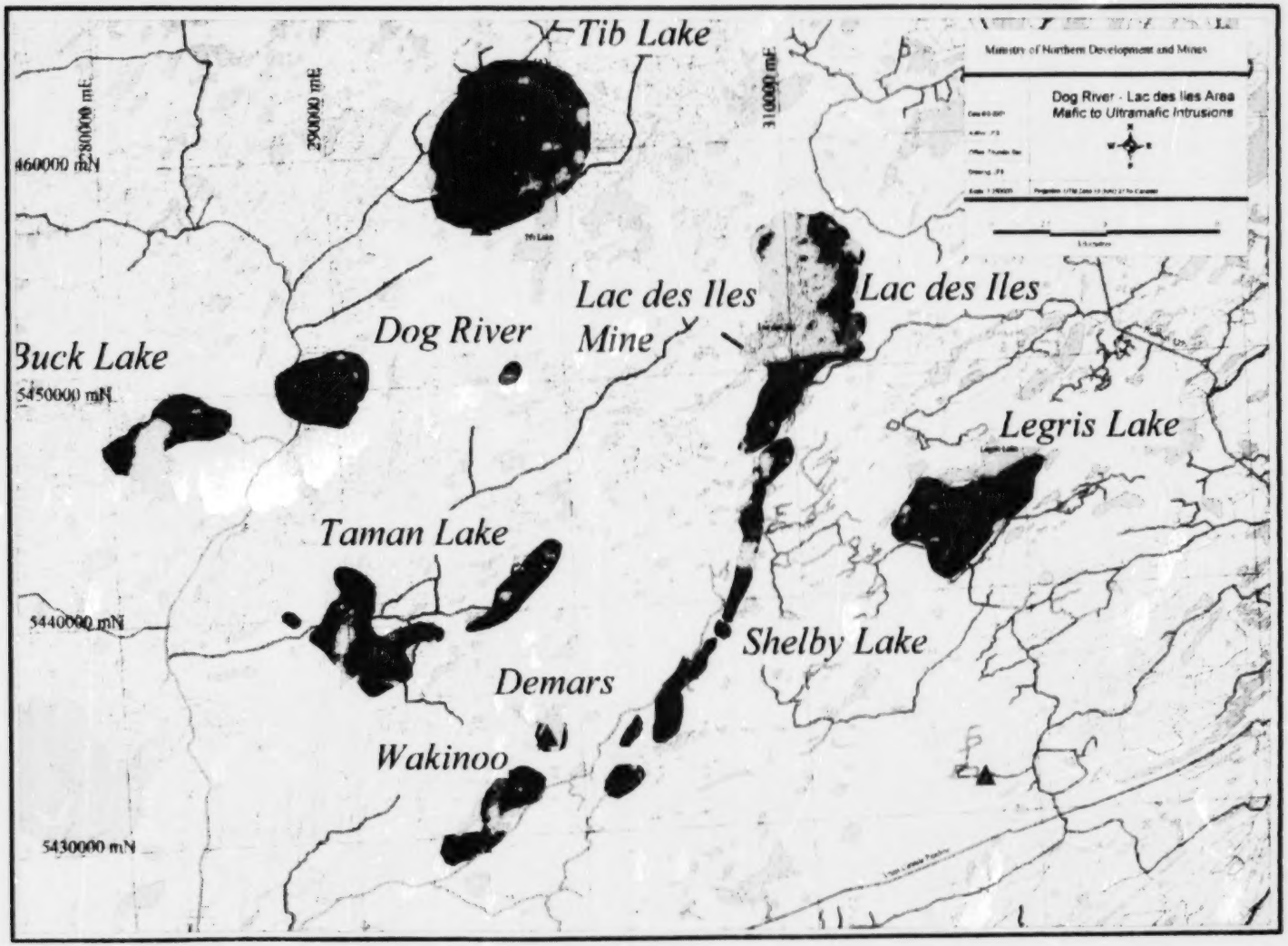

Figure 5. Intrusive complexes in the Lac des Iles - Dog River area.

Buck Lake Area

The Buck Lake area is located approximately 100 km northwest of the Thunder Bay, and 27 km west of North American Palladium Ltd.'s Lac des Iles Mine. The Buck Lake Ventures Ltd. / LMX Resources Ltd. property is located within NTS blocks 52H04/NW and 52G01/NE and is centered near UTM coordinates 5449273m N, 282298m E in UTM Zone 16 North.

The property is accessed via Dog River Road, 110 km west from Thunder Bay along Highway 17. Proceed north along the Dog River Road for about 33 km to the Buck Lake access road. Proceed northwest along the Buck Lake access road for about 4 km to a footbridge across the Dog River. From the boat launch at the river, located a few hundred metres upstream from the footbridge, proceed west (upstream) by boat for 3 km to the principal showing. Alternatively, the principal showing can be reached with an all-terrain vehicle along a backhoe trail that intersects the Buck Lake access road approximately 200 m south of the footbridge.

The Buck Lake property was staked and recorded by William Richmond in June, 1992. Home Ventures Ltd. optioned the property from Richmond (recorded claim holder) and Bob Morehouse and initiated a work program in 1999 (News Release, April 20, 1999). Home Ventures Ltd. reorganized to form Buck Lake Ventures Ltd. (Buck Lake Ventures Ltd., News Release, February 10, 2000). Buck Lake Ventures Ltd. and LMX Resources Ltd. currently have a joint-venture agreement on the Buck Lake property.

The Lac des Iles – Dog River area has been the focus of mineral exploration for copper-nickel-sulfide mineralization in mafic to ultramafic intrusive rocks since the late 1950s. Mapping by Jolliffe (1934), Kaye (1964, 1969), Pye (1968), Sutcliffe (1986), Sutcliffe and Sweeny (1985), Smith and Sutcliffe (1986) and Sage *et al.* (1974), coupled with the numerous exploration reports by mineral exploration companies, have collectively led to a better understanding of the geology of the area.

Diligent prospecting by W. Richmond and B. Morehouse, aided by Ontario Prospectors Assistance Program (OPAP) funding, resulted in the discovery of copper-nickel-platinum-palladium-mineralized rocks at Buck Lake. Selected grab samples taken from the principal showing area returned values up to 0.25% Cu, 0.33% Ni, 316 ppb Au, 2933 ppb Pd, and 2030 ppb Pt. Assays from drill core samples returned values of up to 0.57% Cu, 0.52% Ni, 276 ppb Au, 1900 ppb Pd and 1350 ppb Pt over 0.10 m (Richmond and Morehouse 1997).

The Buck Lake area is located within the Wabigoon Subprovince and is underlain primarily by mafic to ultramafic intrusive rocks of the Buck Lake stock. The stock was emplaced in granitoid host rocks. The Buck Lake stock is one of many mafic to ultramafic intrusions (*e.g.* Dog River, Taman, Demars Lake, Wakinoo Lake, Towle, Shelby Lake, Lac des Iles and Tib Lake) that collectively form a large circular structure, approximately 30 km in diameter (Figure 4). The Legris Lake stock, although not directly on this circular "PGE ring", may be considered to be part of this group. Numerous, smaller mafic stocks and dikes in the Block Creek area also host copper-nickel-PGE-mineralized zones (Resident Geologist's Files, Thunder Bay South District, Thunder Bay).

Sutcliffe (1986) described the geology and the reader is referred to this description for more detail. The important features, according to Sutcliffe (1986), are as follows:

> Mafic to ultramafic plutons of the Lac des Iles area have broad lithological and metallogenic similarities; they are late tectonic and most intrude granitoid host rocks. The intrusions are tholeiitic in affinity and contain phases ranging from ultramafic peridotite and pyroxenitic cumulates to magnesian gabbronorite and iron-rich gabbro. Hybrid marginal zones, consisting of hornblendite intruded by hornblende diorite, are common to many of the intrusions, and are interpreted to be due to contamination of mafic magma by a granitoid component. Most of the intrusions have well-preserved mineralogy and are not significantly deformed nor altered.

Granitoid rocks, into which these intrusions were emplaced, consist of predominantly gneissic tonalite. The mafic intrusions are interpreted, on the basis of field relations, to be comagmatic with a suite of hornblende tonalite to biotite granite which occupies the centre of the circular configuration. Compositions of some of the younger granitoids reflect magma mixing between granite melt and mafic magma.

The Archean rocks in the area are intruded by diabase sheets and dikes of late Proterozoic age. The diabase is typically medium-grained. However, aphanitic, polygonally fractured chill margins are locally observed. Pegmatitic patches are developed toward the top of the diabase sheets, while ophitic textures characterize the lower parts of the sheets. A north-trending diabase dike was traced for several kilometres in the western part of the area, in the vicinity of the Dog River.

To date, sulphide and PGE mineralization has been documented in the Lac des Iles complex, at Legris Lake and in the Tib Lake gabbro, as well as at Demars Lake, Wakinoo Lake, Buck Lake, Shelby Lake and Towle Lake (Resident Geologist's Files, Thunder Bay South District, Thunder Bay). The latter two intrusions make up the southern extension of the Lac des Iles complex (*see also* Property Examinations, this report).

Sutcliffe (1986) described the Buck Lake stock as a mafic to ultramafic, elliptical stock cropping out along the north shore of Buck Lake. The main body of the stock consists of hornblende gabbro and gabbronorite, clinopyroxenite and hornblende clinopyroxenite. Medium-grained, hornblende gabbro is the dominant lithology; it contains local pegmatitic patches with biotite and quartz. Ultramafic rocks within the stock contain variable proportions of hornblende and clinopyroxene. Breccia zones, in which leucocratic phases intrude melanocratic phases, are common in the intrusion. Textures are similar to those along the margins of the Lac des Iles complex. Chalcopyrite, pyrrhotite, and pyrite are present within portions of the Buck Lake stock.

Prospecting of the Buck Lake stock led to the discovery of significant amounts of Cu-Ni-PGE-mineralized rocks (Richmond and Morehouse 1992a, 1992b, 1994a, 1994b, 1997). Pyrite, with lesser amounts of pyrrhotite, chalcopyrite and pentlandite, locally make up 7% of their gabbroic host rocks on the property (Thomson 1992). Grab samples collected by W. Richmond returned assay values of up to 862 ppb Au, 1.8 ppm Ag, 2530 ppm Cu, 3330 ppm Ni, 2030 ppb Pt and 2933 ppb Pd (Richmond and Morehouse 1992a, 1992b, 1994a, 1994b; Thomson 1992; McKay 2000).

In the vicinity of the northern shore of Buck Lake, the Buck Lake stock has been exposed in a series of 17 trenches, located along the long axis of the intrusion. The main occurrence has been exposed in Trench 21+50E and consists of a series of lenticular, mineralized sections that trend to the southeast. Channel sampling over the main breccia zone assayed 0.54g/t Pd+Pt+Au over 46 m (including 0.99g/t Pd+Pt+Au over 10 m)(Buck Lake Ventures Ltd., News Release, August 8, 2000). A sampling program to sample fresh rock was initiated. Grab samples of mineralized pyroxenite breccia, containing blebs of chalcopyrite and pyrrhotite + pentlandite, from the main blast pit yielded the following results: 4.8 g/t Pd, 2.9 g/t Pt, 0.6 g/t Au, 5.8 g/t Ag, 0.02% Co, 0.9% Cu, and 0.9% Ni. Grab samples from a second blast pit in well-mineralized pyroxenite, located 10 m from the first pit, yielded the following results: 1.3 g/t Pd, 0.7 g/t Pt, 0.6 g/t Au, 2.4 g/t Ag, 0.01% Co, 0.2% Cu, and 0.4% Ni (Buck Lake Ventures Ltd. News Release August 8, 2000).

A series of nine grab samples taken by Resident Geologist Program staff across the main zone at Trench 23+50E returned up to 3715 g/t Pd, 2235 g/t Pt with anomalous values of copper, nickel and gold. The sample that produced the best assay was a malachite-stained, medium-grained gabbro with blebs of chalcopyrite. This sample was taken from the main showing area of Trench 23+50E (Resident Geologist's Files, Thunder Bay South District, Thunder Bay).

Work on the property to date comprises linecutting, geophysical surveys (induced polarization, electromagnetic and magnetometer surveys), trenching and stripping, geological mapping, geochemical surveys, prospecting and sampling. Prospectors Richmond and Morehouse drilled some shallow, Winkie drill holes under the main occurrence area. Their drilling intersected coarse- to very coarse-grained, sulphide-bearing, gabbroic rock (Resident Geologist's Files, Thunder Bay South District, Thunder Bay).

Bermuda Property

The Bermuda property was acquired in early 2000 by Freewest Resources Canada Inc. following the discovery of PGE-mineralized gabbro in the Skipper Lake area by prospectors Mick and Steve Stares. A boulder of magnetite-rich gabbro containing disseminated sulphides returned an assay of 3.19 g/t Pd, 0.76 g/t Pd and 0.16 g/t Au (Freewest Resources Canada Inc., World Wide Website, http://www.freewest.com; Press Release, April 18, 2000). Approximately 50 m away, an outcrop of similar, magnetite-rich gabbro was stripped across 12 m of strike. A series of grab samples were collected over the 12 m wide exposure and returned an average grade of 1.05 g/t Pd+Pt+Au (*ibid*).

This property is located within the Mesoproterozoic Coldwell alkalic complex (CAC), approximately 10 km north of Marathon. It is contiguous with the Marathon deposit (recently optioned by Geomaque Explorations Ltd. from Polymet Mining Corp) which has a drill-indicated resource of 37million tonnes grading 1.1 g/t Pd, 0.27 g/t Pt, 0.38% Cu, 0.032% Ni and 0.21 g/t Au (Geomaque Explorations Ltd., Press Release, November 7, 2000). Freewest has conducted prospecting, stripping, mapping, lithogeochemical sampling and channel sampling, as well as an airborne magnetometer and TEM survey and follow-up petrographic study. Detailed and property-wide exploration programs will continue on the Bermuda property in the spring of 2001. Meanwhile, an interpretation of a recent airborne geophysical survey flown over the property is being completed. The survey defined numerous strong, electromagnetic anomalies that warrant follow-up (Freewest Resources Canada Inc., Press Release, December 08, 2000).

The Bermuda property straddles 12 km of the favourable, basal contact units of the CAC known as the Eastern Border gabbro (EBG), in contact with hornfelsed, Archean country rocks. The property is host to several copper- and PGE-mineralized zones, the most significant of which is the Skipper Lake zone.

The Skipper Lake zone (SLZ) has been traced by prospecting over 1.75 km along strike and remains open along strike in all directions (Press Release, September 1, 2000; MacTavish 2000). It is hosted within a 300 m thick, basal sequence of the EBG which consists of medium-grained to pegmatitic, varied-textured, magnetite ± biotite ± olivine gabbro (MacTavish 2000). A layered sequence is laminated and modally layered; it strikes between 90° and 110°, dipping 22° to 30° south-southwest. It hosts the Hillside and Copper Creek occurrences, which have returned up to 0.82% Cu, but no anomalous PGE values. It also hosts several, narrow oxide-rich layers, only one of which has returned significant PGE values (705 ppb Pd+Pt+Au) (*ibid*).

The average of 228 surface samples collected from the SLZ is 0.58 g/t Pd, 0.14 g/t Pt, 0.08 g/t Au. A stripping and channel-sampling program was completed at five locales along the SLZ over an aggregate strike length of 1.1 km. The SLZ has an apparent width of 8 to 10 m as exposed by stripping. The lower contact of the zone has never been exposed so the true thickness of the SLZ is unknown. Saw cut, channel-sampling results are as follows:

Line No.	Sample Width (m)	Cu (ppm)	Pd (g/t)	Pt (g/t)	Au (g/t)	Pd+Pt+Au (g/t)
770W	1.1	1007	0.66	0.35	0.12	1.13
770W	1.5	891	0.74	0.33	0.33	1.40
750W	0.75	637	0.64	0.25	0.10	0.99
745W	2.0	896	0.90	0.23	0.09	1.22
515W	2.7	392	0.88	0.16	0.05	1.09
035E	1.8	189	1.47	0.33	0.15	1.95
050E	2.1	1329	0.86	0.22	0.12	1.20
050E	3.4	2182	1.36	0.28	0.14	1.78
290E	4.3	945	0.96	0.21	0.11	1.28

(Freewest Resources Canada Inc., World Wide Website, http://www.freewest.com)

The SLZ consists of layered, medium-grained, titaniferous magnetite-ilmenite-olivine-plagioclase-apatite cumulates that contain up to 3% finely disseminated sulphides. Total modal oxide content ranges between approximately 30% and 70% total oxides. Clinopyroxene and biotite are intercumulus minerals. Weak to moderate deuteric alteration is typically manifested in clinopyroxene and olivine. Chalcopyrite and bornite, with some pentlandite, cobaltite, galena and chalcocite, have been identified. Several platinum group minerals, typically <20 μm in size, were found in close association with chalcopyrite, pentlandite and less commonly with magnetite. (MacTavish 2000). The average Pd:Pt ratio is 4:1. The SLZ also returns between 7.75 and 11.6% TiO_2 and 0.297 to 0.408% V.

The Four Dam Lake occurrence has returned up to 2.28 g/t Pd+Pt+Au(*ibid*). It consists of disseminated to blebby sulphides in a coarse-grained to pegmatitic, discordant gabbro that is remarkably similar to the Two Duck Lake gabbro, which hosts the Marathon deposit.

The following samples were collected by Resident Geologist Program staff in 2000:

Sample No.	Location	Au (ppb)	Cu (ppm)	Ni (ppm)	Pd (ppb)	Pt (ppb)
00 BFW-01	Skipper Lake shoreline; "discovery outcrop"	128	1202	364	1989	435
00 BFW-02	Skipper Lake, south of camp	72	1327	355	664	155
00 BFW-03	Skipper Lake, south of camp (Chip sample), near [8666]	249	602	304	702	161
00 BFW-04	Skipper Lake, south of camp	34	459	274	704	137
00 BFW-05	Skipper Lake, new showing east of camp	47	1989	192	41	34
00 BFW-06	Skipper Lake, new showing east of camp, near [8687]	132	1033	364	2530	316
00 BFW-07	Skipper Lake, "Broken Hammer" showing, east, near [8699]	7	311	54	57	13
00 BFW-08	Skipper Lake, "Broken Hammer" showing, east of camp	94	2658	229	882	182
00 BFW-09	Four Dam Lake, Creek/waterfall area	770	5813	325	685	570
00 BFW-10	Four Dam Lake, Creek/waterfall area	584	7817	268	643	385
00 BFW-11	Four Dam Lake, north side of lake	67	724	96	118	59
00 BFW-12	Four Dam Lake, north side of lake	17	1570	148	15	16
00 BFW-13	Wullie Lake, near old pits	16.11	490	102	15.93	65.28
00 BFW-14	Wullie Lake, near old pits	18	1413	135	24	11
00 BFW-15	Wullie Lake, old adit/pit	29	4106	265	75	29

The SLZ represents a hitherto unknown style of PGE mineralization within the CAC. It has been compared favourably to classic, reef-type, PGE occurrences (e.g. Merensky Reef of the Bushveld Complex; J-M Reef of the Stillwater Complex) (Freewest Resources Canada Inc., Press Release, December 08, 2000). The dichotomy of mineralization styles between the SLZ and Marathon deposit not only provides new PGE targets in the CAC, but reiterates the importance of developing new exploration models and techniques, and modifying sampling strategies accordingly.

RECOMMENDATIONS FOR EXPLORATION

Base Metal Potential of the Shebandowan Belt

The Shebandowan greenstone belt is host to two past-producing base metal mines: the Shebandowan Ni-Cu-PGE mine and the North Coldstream Mine. Additional base metal target areas include: the Vanguard showing and its western extension for volcanogenic massive sulphide (VMS)-style mineralization; the Burchell Lake area for structurally hosted copper mineralization; the Haines Gabbro and the Thunder Lake mafic-ultramafic complex for mafic intrusion-hosted, Ni-Cu-PGE-style mineralization.

Felsic metavolcanic rocks in Duckworth, Laurie, Horne, Sackville, Aldina, Marks, Adrian and Conmee townships and Dawson Road Lots should all be thoroughly investigated. FIII felsic metavolcanic rocks (Lesher *et al.* 1986) have been identified by Farrow (1995) in the Shebandowan greenstone belt; felsic metavolcanic rocks at Gold Creek and Marks Township are 2719 and 2721 Ma (Corfu and Stott 1998). These dates are similar to other VMS camps located along the Wawa-Quetico subprovincial boundary, including Winston Lake and Manitouwadge.

Recent discoveries of base metal-mineralized, massive sulphide float boulders in Aldina Township by prospectors D. Calvert and M. and S. Stares (*see* Property Examinations, this report) have led to base metal exploration by companies such as Cumberland Resources Limited and RJK Explorations Ltd. and Greater Lenora Resources Corp. Stripping has exposed felsic, fragmental metavolcanic rocks, as well as iron formation and minor zinc-mineralized rock. Till sampling by A. Bajc (Sedimentary Geoscience Section, OGS) suggested that the float boulders, which ran up to 38% Zn, (as well as significant values in copper, lead, silver and gold), are close to their bedrock source (A. Bajc, personal communication, 2000). A highly strained, felsic fragmental unit has been traced for up to 2 km by diamond drilling and stripping. This quartz-feldspar-porphyritic, lapilli tuff unit contains clasts of siliceous, cherty rocks which might represent an exhalative cap rock. Disseminated and stringer sulphides are also present throughout the fragmental unit. Float boulders of a highly strained, felsic lapilli tuff were also observed, immediately adjacent to the Calvert massive sulphide float.

In addition, A. Bajc discovered a large, float boulder of sulphidized iron formation in a gravel pit in Conmee Township, on the west side of Highway 11/17, 600 m north of the Third Concession road (Bajc 1999). Tanton (1928) and Carter (1986) have mapped the area. Detailed mapping is precluded by lack of bedrock exposure. The intense magnetic attraction in the area makes traversing with compasses difficult. The area has been subjected to three different periods of glaciation (Bajc 1999) and hence attempts to trace mineralized boulders to their respective sources are hampered. However, in checking the assessment files (Resident Geologist's Office, Thunder Bay South District, Thunder Bay) for zinc or massive sulphide occurrences in the general, "up-ice" direction, some possible source targets can be identified.

Platinum Group Elements in Quetico Intrusions

The dramatic increase in the price of palladium has renewed interest in a number of the Quetico intrusions. They comprise a group of Archean, mafic to ultramafic, hornblende-rich intrusions typically occurring between the margin of the Quetico batholithic complex and the Quetico fault, east and west of Atikokan (MacTavish 1992, 1999). Intrusions, ranging from diorite to peridotite, commonly host disseminated sulphide zones containing significant values of platinum group elements (PGE), copper, nickel, gold and/or cobalt (*ibid*). These intrusions produce strong, distinct aeromagnetic anomalies, especially when they are hosted by metasedimentary rocks. Similar, possibly related, rocks have been

documented within the Black-Pic batholithic complex, south and east of Manitouwadge (*e.g.* Schnieders and Smyk 1989; Schnieders *et al.* 1996), where they have also returned significant PGE values.

MacTavish (1992, 1999) noted that PGE-mineralized zones typically occur near intrusive contacts, contain between 2 to 10% disseminated sulphide minerals and are preferentially hosted by ultramafic rocks. PGE-barren zones may still contain up to 1% finely disseminated magnetite, pyrrhotite, and chalcopyrite. Although pyrrhotite, pyrite and pentlandite are commonly present, there is a strong correlation between chalcopyrite and PGE assays; elevated PGE values and platinum group minerals are always associated with chalcopyrite-rich rocks. It is recommended that any sulphide-mineralized zone be examined and sampled, especially those rich in chalcopyrite.

Recent prospecting by 1349563 Ontario Ltd. in the North Elbow Lake area discovered coarse-grained, disseminated sulphides on the flank of an aeromagnetic anomaly. Sulphide blebs, with chalcopyrite rimming pyrrhotite, are hosted by hornblendite and websterite; varied-textured gabbros are also present (A. Eveleigh, personal communication, 2000). Grab samples assayed up to 5 g/t Pt, 1.5 g/t Pd, 3.73% Cu and 0.6% Ni (*ibid*).

Additional prospecting on the Nym Lake intrusion in 2000 located several new sulphide occurrences across the 3.5 km long magnetic anomaly. Previous grab sampling had returned results as high as 3 g/t Pt+Pd+Au, 0.45% Cu and 0.08% Ni (Band-Ore Resources, World Wide Website, http://www.band-ore.com, Press Release, May 03, 1999). Reconnaissance investigations and sampling by Resident Geologist Program staff in 2000 at location 15U 0615398/5394186 noted disseminated chalcopyrite and pyrrhotite blebs. A small sulphide seam, striking 170°, assayed up to 261 ppb Pd, 286 ppb Pt, 19.12 ppb Au, 0.24% Cu and 0.04% Ni (Resident Geologist's Files, Thunder Bay South District, Thunder Bay). Further to the west (15U 0614773/5394148), a magmatic breccia was traced for more than 100 m. Several breccias were noted, including those with ultramafic fragments (possibly hornblendite) in a more feldspathic gabbro, and others with serpentinized or epidotized fragments in a gabbroic or lamprophyric matrix. Minor, disseminated sulphides were present. Anomalous PGE values were reported from sample 00 BNL-06 (111 ppb Pd, 99 ppb Pt, 34.6 ppb Au, 0.17% Cu and 0.03% Ni) (*ibid*). Further prospecting and sampling in these areas are warranted.

Recommendations and exploration guidelines regarding PGE mineralization in Proterozoic rocks in the Thunder Bay area were given by Schnieders *et al.* (1998) and are presented later in this report.

Tantalum and Other Rare Metals in Pegmatites

Recent dramatic increases in the price of tantalum have been the result of higher demand for tantalum-based products, such as capacitors in the electronics industry. Higher prices (Avalon Ventures Ltd., Press Release, December 11, 2000) have also prompted interest in the local exploration community, as noted by Bubar (2000). Avalon Ventures Ltd. has recently acquired property in the Coldwell alkalic complex (World Wide Website, http://www.avalonventures.com; Press Release, December 18, 2000) and has drilled its Lilypad Lakes property, where economically significant sections of tantalum-mineralized pegmatite (ranging from 0.023% to 0.158% Ta_2O_5 (0.5 to 3.5 lb/tonne) over estimated true widths of 0.5 to 28.0 m) were intersected in eight drill holes (Press Release, January 03, 2001).

Tantalum is typically found in the minerals:

- tantalite [$(Fe,Mn)Ta_2O_6$], analogous with its solid-solution counterpart, columbite [$(Fe,Mn,Mg)Nb_2O_6$])
- euxenite [$(Y,Ca,Ce,U,Th)(Nb,Ta,Ti)_2O_6$]
- pyrochlore [$(Na,Ca)_2Nb_2O_6(OH,F)$], in a similar mineral, microlite [$(Ca,Na)_2Ta_2O_6(O,OH,F)$]

- wodginite [$Mn(Sn,Ta)Ta_2O_8$]
- tapiolite [$(Fe,Mn)(Ta,Nb)_2O_6$]
- strüverite [$(Ti,Ta,Fe)O_2$]

It is also found as a trace element in rutile (TiO_2) and cassiterite (SnO_2). Economic concentrations of tantalum and niobium are typically associated with carbonatite-alkalic complexes, pegmatites and S-type granitoids in association with other rare metals (*e.g.* lithium, cesium, rubidium, beryllium, zirconium, *etc.*), uranium, thorium and rare earth elements. Tantalum is also a byproduct from the extraction of tin. Tantalum is mentioned in compilations of niobium (*a.k.a.* columbium) and pegmatite deposits in Ontario, prepared by Ferguson (1971) and Hewitt (1967), respectively.

Walker *et al.* (1993) provided an overview of rare metal occurrences in the Coldwell alkalic complex (CAC). Grab samples returned the following analytical results:

Occurrence	Rare Metal Minerals	Nb_2O_5 (%)	Ta (ppm)
Port Munro	pyrochlore, columbite, bastnaesite, synchisite	0.47	119
Marathon Niobium	pyrochlore, columbite	0.51	143
Ypres Point		0.60	
Carden Cove		0.50 / 0.76	134 / 75
Peninsula Hill	columbite, bastnaesite, synchisite	0.49	164
Marathon REE	bastnaesite, synchisite	0.20	81
Mink Creek	bastnaesite, synchisite	0.67	129

Grab samples collected by Avalon Ventures Ltd. on the Coldwell property returned up to 0.03% Ta_2O_5 (Press Release, December 18, 2000). McLaughlin (1990) provided microprobe analyses of accessory rare metal minerals in syenites and related pegmatites in the Coldwell alkalic complex:

Mineral	Host Rock	Highest Ta_2O_5 Value (%)
Pyrochlore	Contaminated ferro-edenite syenite	3.10
	Quartz syenite	6.50
	Altered Craddock Cove syenite	7.47
	Eastern contact pegmatite	5.64
Columbite	Ferro-edenite syenite	4.76
	Quartz syenite dykes	3.94
Niobian rutile	Eastern contact pegmatite	4.25
	Center III quartz syenite	3.91

Walker *et al.* (1993) classified three sub-types of pegmatite in the Coldwell complex:
(i) Nb-Zr-REE; (ii) REE-Th; and (iii) Nb-Zr-REE, quartz-absent pegmatites.

Mariano (1979), as reported in Sage (1987), noted up to 2% Ta_2O_5 in pyrochlore from the Prairie Lake carbonatite. Similar values (≤3.50% Ta_2O_5) were obtained by Hammond (1999).

Zayachivsky (1985) discovered that tantalite-columbite minerals (TCM) were more extensively distributed in the Georgia Lake pegmatite field (Pye 1965) than had previously been reported. Although traces of TCM are dispersed with interstitial minerals (*e.g.* Brink, Southwest pegmatites) and spodumene-quartz intergrowth (*e.g.* MNW pegmatite), most are associated with secondary albitization. At the MNW pegmatite, where TCM may reach economic concentrations, they occur as inclusions in tin oxide minerals and as separate, tabular crystals along the albitization front marked by fans of albite (*a.k.a.* cleavelandite) (*ibid*).

The fundamental rock-forming assemblage of barren, rare element pegmatites is potassic feldspar, albitic plagioclase, quartz and subordinate, if any, muscovite or biotite. Highly fractionated pegmatites, with very diverse mineral assemblages, are enhanced by phases with rare alkali elements and volatile components (*e.g.* Li, Rb, Cs, H_2O, F_2, B_2O_3, P_2O_5) (Černý 1991a). Černý (1991a,b) subdivided rare element-bearing pegmatites on the basis of their constituent mineral assemblages, geochemical signatures and associated source and host rocks.

Pegmatite Family	**Elemental Assemblage** *(in approximate order of decreasing abundance)*			
	Substantial	Subordinate	Minor	Trace
"LCT" (Li-Cs-Ta)	O, Si, Al, K, Na, **Li**	**Rb**, **Cs**, Ca, Fe, Mn, Mg, F, B, P	**Be**, **Sn**, Ba, Sr, **Nb**, **Ta**, Ti, Zr, Hf	Y, REE, **Ga**, W, Sc, C, S, Zn, As, Cu, Pb, Cd, Tl, Ge, Mo, Sb, Bi
"NYF" (Nb-Y-F)	O, Si, Al, K, Na	Ca, Fe, Mg, F, Rb, Ba, Li	Sr, Mn, **Y**, **REE**, Cl, Be, Ba, **Ti**, **Th**, **U**, **Zr**, **Nb**, Ta, B, P, Cs, Hf	Sc, W, Zn, Ga, C, S, Mo, As, Bi

(Bolded elements are those generally considered of economic interest within each respective pegmatite family.)

Based on this classification scheme, the pegmatites of the CAC would fall into the NYF family, whereas those in Superior Province Archean rocks (*e.g.* Georgia Lake, Dryden, Separation Rapids, Lilypad Lakes, *etc.*) would be LCT pegmatites. Archean, rare element-bearing pegmatites in Ontario and adjacent Manitoba are spatially associated with peraluminous, plutonic complexes of the two-mica suite (Černý and Meintzer 1988; Fyon *et al.* 1992).

Černý (1991b) cited the following exploration criteria for LCT pegmatites:

- They are associated with orogenic activity and hosted by supracrustal rocks of lower-pressure, lower amphibolite-facies metamorphism. These favourable zones commonly coincide with regional fault structures and subprovincial boundaries.
- Deep, large-scale fault systems and related structures host fertile, parental granitoids
- Fertile granites are foci of variably zoned, concentric or uni-directional pegmatite groups; geochemistry may help elucidate cryptic zoning
- Individual pegmatite types within the rare element class can be identified by their characteristic paragenesis; geochemical signatures of rock-forming minerals can provide estimation of pegmatite type
- Within individual pegmatites, the search for specific ores is guided by:
    - Zoning of primary units
    - Distribution and nature of secondary assemblages
    - Geochemical indicators of fractionation
    - Mineral chemistry may reflect elemental concentration in pegmatite as a whole
- Dispersion haloes of rare alkali elements and some other elements (*e.g.* Be, Sn, Cu) in country rocks may be delineated in regional geochemical surveys.

Noting that rare metal pegmatite deposits are difficult to find in the Superior Province, largely because they do not respond well to most airborne or ground geophysical surveys, an exploration strategy was developed by Breaks and Tindle (1997). Citing the discovery of the Big Whopper pegmatite system in the Separation Rapids area as an example, they stressed the importance of:

- Recognition of parent granite plutons and their internal fractionation trends, based on bulk chemical and mineralogical data.
  - Highly evolved, Mn-tantalite minerals were discovered in cleavelandite-rich pods proximal to the pegmatites.
  - Strong fractionation of tantalum relative to niobium results in significantly lower Nb/Ta bulk rock geochemical ratios than that of average crust (Nb/Ta = 11.4).
- Detection of exomorphic lithium, potassium and rubidium dispersion haloes in mafic metavolcanic host rocks, augmented by metasomatic selvage data.
  - Lithium is most useful as an exploration tool because it is the most mobile exomorphic element and commonly forms haloes many times larger than the pegmatites themselves. The mean level of lithium in Superior Province metavolcanic rocks not known to contain rare metal mineralization is 16 ppm Li (Breaks 1989).
  - The chemistry of metasomatic selvages in supracrustal country rocks along the contact with pegmatites reflects the internal mineralogy of the spatially associated pegmatite. Elevated levels of certain rare metals in these altered zones should indicate that minerals containing those same rare metals occur in the adjacent pegmatite.

Breaks and Tindle (1997) cited the following attributes of parental granite plutons:

- Small areal extent, typically >10 km^2
- Textural and grain-size heterogeneity (*a.k.a.* "pegmatitic granites")
- Diagnostic peraluminous accessory and varietal minerals (*e.g.* primary muscovite, cordierite, aluminous biotite, garnet, tourmaline; rare beryl and topaz)
- Rare metal-bearing minerals may be present (*e.g.* beryl, columbite, Li-tourmaline).

Spodumene, lepidolite and tourmaline have been considered indicator minerals for tantalum prospecting by Avalon Ventures Ltd. (World Wide Website, http://www.avalonventures.com). A gravity survey was employed to help identify parental granites and pegmatites at their Lilypad Lakes tantalum-cesium property (Avalon Ventures Ltd., Annual Report 2000, p.5). Significant values of tantalum, as determined by the X-Ray fluorescence (XRF) method, are considered to be those greater than 100 ppm Ta (World Wide Website, http://www.avalonventures.com).

Bear in mind, however, that some notable exceptions to the parental granite source hypothesis exist. For example, Partington *et al.* (1995) stated that there was no demonstrable relationship between a parental granitoid and Li-Sn-Ta-Nb-mineralized pegmatites in the Greenbushes district, Australia. In such cases, the pegmatites themselves must be identified, delineated and evaluated using traditional prospecting, mapping and sampling methods.

Copper-Nickel-Platinum Group Element Deposits Associated with the Midcontinent Rift

The Mesoproterozoic Midcontinent Rift (MCR), also known as the Keweenawan Rift, consists of three major components:

(1) a thick edifice of subaerial flood basalt lava flows;
(2) local concentrations of intrusive rocks; and
(3) an upper sequence of sedimentary rocks (Miller *et al.* 1995a)

that span a period between 1108 and 1086 Ma (Davis and Green 1997). MCR intrusions are well-represented on the north shore of Lake Superior, where they are host to a number of PGE, copper-nickel and Fe-Ti-oxide occurrences (Miller *et al.*1995b).

Rift-related intrusive rocks, such as the Duluth Complex in Minnesota, the Mellen Complex in Wisconsin, the Logan sills and Nipigon plate near Thunder Bay, as well as the alkalic-carbonatite complexes near Marathon, are most commonly exposed along the margins of the MCR. The presence of widespread disseminated Ni-Cu-sulphide mineralization in basal units of the Duluth Complex, the Mellen Complex, the Coldwell alkalic complex, and in a number of gabbroic to peridotitic dykes and sills, shows that processes necessary for the formation of sulphide deposits were active in some intrusions locally in the MCR (Schulz and Cannon 1997; World Wide Website, http://minerals.usgs.gov/east/pubs/mwni_cu/#rift system).

Comparisons have been made between the MCR and the Noril'sk region based on the following similarities:

(4) intraplate mantle plume caused melting of continental lithosphere, the generation of voluminous co-magmatic intrusive and volcanic rocks that interacted with continental crust;
(5) resultant basalts are heavily contaminated (elevated SiO_2, MgO/Ni, La/Sm and Th/Y ratios) and depleted in nickel, copper and PGE

(Lightfoot *et al.* 1991; Naldrett 1992; Naldrett and Lightfoot 1993; Lightfoot and Keays 1994; Lightfoot and Lavigne 1995; Schulz and Cannon 1997).

Other criteria which support a Noril'sk analogue include:

- *Structure:* Major mantle-penetrating faults associated with a triple junction in a region of attenuated crust. Both rift-parallel, normal faults and oblique, transcurrent faults are associated with the MCR. Middleton (2000) has suggested that the regional, east-trending Quetico and Paint Lake faults were active in the Mesoproterozoic and exerted a control on the emplacement of the picritic, ultramafic cone sheets, lopoliths sills and dykes near Lake Nipigon, described by Sutcliffe (1987). Remnant magnetism studies show that the magnetic polarity of the Logan sills is reversed (producing a magnetic "low"), whereas the ultramafic intrusions are positively polarized, yielding magnetic "highs" (Middleton 2000).
- *Sulphur Sources:* Local sulphur sources exist in Paleoproterozoic (Animikie Group) and Mesoproterozoic (Sibley Group) sedimentary rocks, as well as in the Archean basement. The most extensive of these potential sources is a decametres-thick succession of dolomite and gypsum within the Rossport Formation near the Sibley Basin center in the Black Sturgeon Lake area (Fralick *et al.* 2000). Data from the Duluth Complex indicate similar sulphur-isotopic signatures exist between basement sedimentary rocks and Ni-Cu-sulphides (Mainwaring and Naldrett 1974).
- *Comagmatism:* Picritic and tholeiitic basalts occur with comagmatic intrusions. Many of the Logan diabase sills and Nipigon Plate picritic (differentiated?) intrusions may be comagmatic with components of the Osler and North Shore Volcanic groups (Davis and Sutcliffe 1985; Sutcliffe 1987; Davis and Green 1997). Geochemical evidence for repeated influxes of magma (*e.g.* changing incompatible element, isotopic or Ni, Cu and PGE ratios) has yet to be gathered in order to support an open-system intrusion hypothesis.

- *Sulphide occurrences:* A number of local PGE occurrences, prospects and deposits have been tabulated below:

Intrusion / Lithology	Mineralization Style	Local Examples *(Associated PGE-Mineralized Areas)*	
Logan diabase sills, cone sheets	Sparse, disseminated sulphides	*(Numerous)*	
Tholeiitic to alkaline complexes: Coldwell alkalic complex Killala Lake alkalic complex	Disseminated sulphides in medium- to coarse-grained, vari-textured (*a.k.a.* taxitic) gabbro	Coldwell	Killala Lake
		Two Duck Lake gabbro *(Marathon deposit);* Geordie Lake gabbro	Border gabbro *(Sandspit - Killala)*
	Disseminated sulphides in massive Fe-Ti-oxide cumulate layers	Eastern Border gabbro *(Skipper Lake zone)*	*(Unknown)*
Pigeon River and Arrow River diabase dykes	Disseminated sulphides in medium- to coarse-grained gabbro and diabase	*(Wallenius; Naomi Island; Jarvis Point)*	
Layered gabbro-anorthositic intrusions: Crystal Lake Gabbro	Disseminated and blebby sulphides in medium- to coarse-grained, varied-textured (*a.k.a.* 'taxitic') gabbro	Crystal Lake Gabbro *(Great Lakes Nickel deposit)*	
	Disseminated sulphides in Cr-spinel-bearing cumulate layers	*(Cr-spinel-bearing, anorthositic gabbro above Cu-Ni deposit)*	
Pine Point - Mount Mollie Gabbro	Disseminated, intergranular sulphides, fracture fillings	*(Mount Mollie; Pine River)*	
Layered(?) picritic ultramafic intrusions	Disseminated sulphides and native metals in lherzolite, dunite, peridotite, etc.	Leckie Lake *(Wolf Mountain);* Hele Township; Eva-Kitto townships	

OGS ACTIVITIES AND RESEARCH BY OTHERS

1) T. Hart, Precambrian Geoscience Section, OGS, carried out mapping in the Heaven Lake and Lac des Iles greenstone belts, approximately 100 km and 90 km north of Thunder Bay, respectively (Hart and MacDonald 2000a,b). The projects helped to evaluate the economic potential of the belts in combination with the recently released *Ontario Treasure Hunt* (OTH) Garden-Obonga geophysical survey (OGS 2000e). They also evaluated the position of the belts within the tectonostratigraphic framework of the central Wabigoon Subprovince as proposed by the Western Superior NATMAP project. A major tectonic boundary has been inferred within the Heaven Lake belt, based on the occurrence of both Meso- and Neoarchean supracrustal rocks (Tomlinson *et al.* 1998). Although past exploration has focussed on intermediate metavolcanic-hosted volcanogenic massive sulphide (VMS) deposits, current mapping has suggested that a meso-epithermal style of gold mineralization may be associated with both these metavolcanic rocks and younger granodiorite near Nault Lake (Hart and MacDonald 2000a). Recommendations for VMS base metal deposits, as well as gold and platinum group element (PGE) deposits were also provided (Hart and MacDonald 2000b).

2) D. Stone, Precambrian Geoscience Section, OGS, carried out mapping in the Petry River area, 150 km northwest of Thunder Bay (Stone and Hallé 2000). This project was a continuation of 1:50 000 scale mapping that was initiated in 1995 on parts of the south-central Wabigoon Subprovince, integrated with the Western Superior NATMAP and LITHOPROBE transect. Regional mapping has identified several potential exploration targets and has provided a framework for lake bottom sediment anomalies (rare earth elements, Ba, Co, Cr, Fe, Mo, Nb, Sc, Sn, Th, U, V, Y, and Zn) generated by Dyer and Breaks (1996). PGE targets were identified in mafic intrusions at Little Trewartha, Pakashkan and Weaver lakes and near Graham (Stone and Hallé 2000). Rare element-bearing pegmatites were noted between Selwyn and Wawang lakes (*ibid*).

3) T. Morris, Sedimentary Geoscience Section, OGS, carried out Quaternary geology mapping and overburden sampling in the Schreiber area (NTS sheets 42 D/14, 42 E/03; parts of 42 D/10, 42 D/11,) (Morris 2000). This is a continuation of a similar project conducted in the Killala Lake area last year (Morris 1999; Morris *et al.* 2000). The focus of field investigations in 2000 shifted west to cover the western edge of the Trans-Superior Tectonic Zone which has been considered a potential kimberlite host (Sage 1999). All overburden samples will be processed for kimberlite indicator minerals (KIMs), magmatic massive sulphide indicator minerals (MMSIMs®), gold, carbonatite-associated minerals and platinum group minerals (PGMs). Additional modern alluvium samples were collected at Cameco Gold Inc.'s Empress property and at the Gold Range property for gold grain analysis. Till samples, including humus, "B" and "C" horizon material, were collected for geochemical analysis.

4) C. Searcy, Sedimentary Geoscience Section, OGS, carried out sampling of overburden in areas of known platinum group element occurrences north and west of Thunder Bay (Searcy 2000). Study areas included: Samuels Lake, Nym Lake, Haines Township (*a.k.a.* Haines Gabbro), Buck Lake, Lac des Iles (Baker and Powerhouse zones), Legris Lake and Wolf Mountain. Samples were collected from road cuts, trench exposures or hand-dug test pits, approximately 1 m deep. Humus, "B" and "C" horizon samples, were collected for geochemical analysis. A heavy mineral concentrate derived from the sand-sized fraction will be visually analyzed for indicator minerals that are associated not only with PGE, but also with gold, kimberlite and the MMSIM® suite. The outer bark of black spruce trees was collected for geochemical analysis.

5) A. Bajc, Sedimentary Geoscience Section, OGS, carried out a follow-up till sampling program that was recommended by the staff of the Resident Geologist Program. Bajc identified a well-defined, 2 km long, glacial dispersal train, elevated in base metals as well as several volcanogenic massive sulphide (VMS) indicator elements (*Canada Stockwatch*, December 20, 2000). Work by Bajc (in progress) also suggested that the float source is local, and likely within the main felsic unit.

6) A number of reports and maps related to surveys conducted in the Thunder Bay South District *under Operation Treasure Hunt* were released in 2000:

Survey	Type	Publication (Reference)
Armstrong-Lake Nipigon	Lake Sediment	OFR 6027 / MRD 56 (OGS 2000a)
Atikokan*	Lake Sediment	OFR 6034 / MRD 63 (OGS 2000c); OFR 5986 (Dyer 1999)
Garden-Obonga*	Lake Sediment	OFR 6028 / MRD 57 (OGS 2000b)
Hemlo*	Lake Sediment	OFR 6036 / MRD 65 (OGS 2000d); OFR 5968 (Dyer 1998)
Schreiber-Terrace Bay*	Lake Sediment	OFR 6036 / MRD 65 (OGS 2000d); OFR 5964 (Dyer 1997)
*(*samples from a previous survey were re-analyzed for Au, PGE)*		
Garden-Obonga	Airborne Geophysical	Maps 82 073 to 82 083 incl. (scale 1:20 000)
Schreiber	Airborne Geophysical	Maps 82 096 to 82 123 incl. (scale 1:20 000)

7) R. Dyer, Sedimentary Geoscience Section, OGS, supervised a bedrock aggregate resource evaluation and an industrial mineral project under the auspices of *Operation Treasure Hunt* (Dyer 2000). Part of this initiative was a study of the bedrock aggregate resource potential along the north shore of Lake Superior. A. Cooper, with the consulting firm of Jagger Hims Limited, conducted field work and research in conjunction with staff of the Resident Geologist Program. An Open File Report and a series of Bedrock Resource Maps are slated for release.

8) S. Beskar (B.Sc. candidate, University of St. Thomas, St. Paul, Minnesota), under the supervision of L. Lamb, is studying core drilled by North Atlantic Nickel Corp., Dumont Nickel Inc. and M. Chaschuk in the Blake Township area. The petrography and sulphide mineralization of the Mesoproterozoic (Keweenawan) gabbroic intrusions will be documented in the context of copper-nickel-PGE potential.

9) G. Williams (The University of Adelaide, South Australia) and P. Schmidt (CSIRO, North Ryde, New South Wales) are investigating the paleomagnetism of the Paleoproterozoic Gunflint Formation near Thunder Bay.

10) A number of theses are in progress at Lakehead University, Thunder Bay, Ontario:

Candidate	Thesis Title
L. Charpentier	Archean granitoids of northwestern Ontario: Rock magnetic constraints on emplacement and origin (M.Sc.)
O. Amurawaiye	Depositional system analysis of the Paleoproterozoic Rove Formation, Thunder Bay region, Ontario (H.B.Sc.)
D. Baker	Paleomagnetism of the Proterozoic diabase: Dating mineralization events (H.B.Sc.)
D. Bihari	Alteration and PGE-Au mineralization in the North Roby Zone, Lac des Iles Mine (H.B.Sc.)
T. Hamilton	Paleoseismicity and paleostress trajectories determined from magnetic fabrics (H.B.Sc.)
J. Johnson	Fluid inclusion studies of hydrothermal alteration in the Roby Zone, Lac des Iles Mine (H.B.Sc.)
B. Rogala	Cyclic evaporitic sedimentation in the Mesoproterozoic Sibley Group, northwestern Ontario (H.B.Sc.)

11) N. Pettigrew (M.Sc. candidate, University of Ottawa, Ottawa, Ontario) is working on the Samuels Lake mafic-ultramafic intrusion and its associated copper-nickel-PGE mineralization. B. Lassen (Ph.D. candidate, University of Ottawa, Ottawa, Ontario) is studying the perology and petrochemistry of other Quetico intrusions in the Atikokan area. Both thesis are supervised by Dr. K. Hattori.

Table 5. Publications received by the Thunder Bay South Resident Geologist's Office in 2000.

Title	Author(s)	Type and Year of Publication
Geology of the Mesoproterozoic Sibley Group	P. Fralick, M. Smyk and M. Mailman	Field Trip Guidebook, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 2 (2000)
Geoarchaeology of the Thunder Bay area	B. Phillips, J. Stewart, S. Hamilton, P. Julig and B. Ross	Field Trip Guidebook, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 2 (2000)
Depositional environments of the Paleoproterozoic Gunflint Formation	P. Pufahl and P. Fralick	Field Trip Guidebook, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 2 (2000)
Glacial history and regional till sampling in the Archean Shebandowan greenstone belt	A. Bajc	Field Trip Guidebook, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 2 (2000)
Mesoarchean geology of the Steep Rock and Lumby Lake terrains	D. Stone, K. Tomlinson, R. Bernatchez and P. Fralick	Field Trip Guidebook, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 2 (2000)
Geology of the Lac des Iles PGE-Cu-Ni Mine	M. Lavigne and Staff (North American Palladium Ltd.)	Field Trip Guidebook, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 2 (2000)
A review of structures in rocks of the Quetico Subprovince and adjacent terranes	M. Kehlenbeck	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Western Superior Province: Geochronologic aspects	D. Davis	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Western Superior Province: Volcanological aspects	K. Tomlinson	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Western Superior Province: Sedimentological aspects	P. Fralick	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Hf isotope study on zircons from the western Superior Province	D. Davis, Y. Amelin, G. Nowell and R. Parrish	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Samuels Lake intrusion: A PGE-bearing, Quetico-type intrusion in the central, western Quetico Subprovince, northwestern Ontario	N. Pettigrew, K. Hattori and J. Percival	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Kimberlite, base metal, gold and carbonatite exploration targets, derived from overburden heavy mineral data, Killala Lake area, northwestern Ontario	T. Morris, R. Sage and D. Crabtree	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Results of regional till sampling in the western part of the Shebandowan greenstone belt, northwestern Ontario	A. Bajc	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)

Title	Author(s)	Type and Year of Publication
The Lac des Iles Mine, northwestern Ontario	M. Lavigne	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Western Superior Province: Proterozoic sediments	P. Fralick	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Vein-type deposits of the Thunder Bay area	S. Kissin	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
A possible Sudbury ejecta layer in the Gunflint Formation, northwestern Ontario	S. Kissin, M. Okamoto, W. Addison and G. Brumpton	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Nature and distribution of Logan diabase sills and gabbro channels in the Keweenawan rift near Thunder Bay, Ontario: Brief comparison to Noril'sk	J. North	Abstract, 46th Institute on Lake Superior Geology, Annual Meeting, Thunder Bay, Ontario, Proceedings Volume 46, Part 1 (2000)
Noril'sk-style Cu-Ni-PGE mineralization in the Nipigon Plate-Lake Superior region	B. Middleton	Ontario Exploration and Geoscience Symposium, Toronto, December 11-12, 2000, Speaker Abstracts, p.13 (2000)
A new style of PGE mineralization within the Coldwell alkaline complex, northwestern Ontario	D. Hoy and A. MacTavish	Ontario Exploration and Geoscience Symposium, Toronto, December 11-12, 2000, Speaker Abstracts, p.3 (2000)
Integration of geology and geophysics in the Operation Treasure Hunt Garden-Obonga area, northwestern Ontario	T. Hart and J. Rudd	Ontario Exploration and Geoscience Symposium, Toronto, December 11-12, 2000, Speaker Abstracts, p.8 (2000)
Evidence for initial calcite-aragonite composition of Lower Algal Chert Member ooids and stromatolites, Paleoproterozoic Gunflint Formation, Ontario, Canada	M.G. Sommers, S.M. Awramik and K.S. Woo	Canadian Journal of Earth Sciences, v.37, p. 1229-1243

Table 6. Mineral deposits not being mined in the Thunder Bay South District in 2000.

Abbreviations

AF ..... Assessment Files
CMH ..... Canadian Mines Handbook
GR ..... Geological Report
MDC ..... Mineral Deposit Circular
MDIR ..... Mineral Deposit Inventory record
MLS ..... Mining Lands, Sudbury
MR ..... Mining Recorder
NM ..... The Northern Miner
OFR ..... Open File Report
PC ..... Personal Communication

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Anderson Lake 52A/10NE	Mo	1 346 000 T @ (grade unstated)	Open for staking	W.N. Ingham (16/06/59) in Prospectus, Lindsay Explorations Ltd. (19/06/59)	Inactive
Ardeen Mine 52B/10SE,SW	Au	90 650 T @ 15.3 g/T Au (uncut) [84 904 T @ 11.6 g/T Au, assays cut to 2 oz Au /t]; inferred resource of 1 082 939 T @ 14.4 g/T Au (uncut) [991 739 T @ 11.2 g/T Au, assays cut to 2 oz Au /t]	Pele Mountain Resources Inc. (CMH 2000-2001, p.315)	The Ontario Prospector, v.1, no.3, p.35 (1998); CMH 1999-2000, p.332	Over $2 M spent in exploration since acquisition in 1996
Atikokan Iron Mine 52B/14	Fe, Cu	12 000 000 T @ 35% Fe, 0.040% Cu	K. Bjorkman (Resident Geologist's Files)	NM (26/10/72)	Inactive
Aumacho (Brink) 42E/05SW	Li	759 475 T @ 1.65% Li_2O, plus 96 000 T @ 1.5% Li_2O	A. Hayes (Resident Geologist's Files)	GR 31, p.64 (1965)	Active; VLF-EM survey conducted in 1995
Coco-Estelle 42E/03SW	Au	53 700 t @10.7 g/t	Inmet Mining Corporation (Resident Geologist's Files)	AF	Inactive; last optioned to Battle Mountain Canada Ltd. 1996-97
Coldstream Porphyry 52B/10SE	Au	3.2 MT @ 0.066 opt Au	Newhawk Gold Mines Ltd. (CMH 1999-2000, p.295); merged into wholly owned subsidiary of Silver Standard Resources Inc. (CMH 2000-2001, p.277)	AF	Drilled by Noranda and Freewest 1990/1991; now seeking JV partner
Conway 52H/08NE	Li	1.83MT @ 0.96% Li_2O to 300 m	E.S. Conway (Resident Geologist's Files)	GR 31, p.68 (1965)	inactive
Coubran Lake 42D/16NW,SW	Cu, Fe, Ti, P	60 MT @ 0.2% Cu, 27% Fe, 5% Ti, 5% P; plus 32 MT @0.3% Cu, 23% Fe, 0.02% Ni, 2.48%Ti, 0.36% P	Franco-Nevada Mining Corp. Ltd. (CMH 1996-97, p.173)	AF (F.N. 2.14737; 1991)	87 leases and additional claims acquired from acquisition of Redstone Resources Inc.; optioned currently to Aurogin Resources Ltd.

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Dead Horse Creek North 42D/15SE	Pb, Zn, Ag	14 000 T @ 1.45% Pb, 7.28% Zn, 8.27 opt Ag	J. Halonen estate (Resident Geologist's Files)	Resident Geologist's Files	Inactive
Dead Horse Creek South 42D/15SE	Pb, Zn, Ag	35 000 T and 36 000 T (Zones 1 and 2) @ 19.87% Pb, 9.08% Zn, 27.65 opt Ag	J. McCabe (Resident Geologist's Files)	(Resident Geologist's Files)	Inactive
Dorion Mine 52A/15	Pb, Zn	Maximum of 35 000 T @ 10% Pb	D. Petrunka Estate (Resident Geologist's Files)	Prospectus, Andowan Mines Ltd. (30/03/57)	Inactive
Elizabeth Mine 52B/13SE	Au	250 000 tons @ 4.57 g/t Au	Mimiska (Société Minière) Inc.; [delisted 1999; CMH 2000-2001, p.260]	CMH, 1998-99, p.309	Inactive
Great Lakes Nickel 52A/4SE	Cu, Ni, PGE	45.6 MT @ 0.344% Cu, 0.183% Ni; Pt & Pd values	Great Lakes Nickel Limited (CMH 2000-2001, p.190)	CMH, 1999-2000, p.199	1970s bulk sample and feasibility study
Hammond Reef 52B/14NW	Au	85 mt @ 0.93 g/t Au (= 2.56 million oz Au)	Pentland Firth Ventures Ltd. (CMH 2000-2001, p.315)	News release, Pentland Firth Ventures Ltd., 1997	1997: drilling, channel sampling and inventory calculation
Hemlo (Interlake) 42C/12NW	Au	10.8 M tons @ 0.216 opT Au (= 2 328 000 oz Au)	Franco-Nevada Mining Corporation Limited (CMH 2000-2001, p.165)	First-Quarter Report, Franco-Nevada Mining Corporation Limited, 1999	Advanced exploration drifting and underground diamond drilling 1998-1999; Teck Corporation and Homestake Canada Inc. have right of first proposal
Jack Lake 52B/14SW	Au	Possible: 75 000 T @ 0.35 opT Au and 3000 T @ 0.30 opT Au[1]; or 100 000 T @ 0.45 opT[2]	M. Wicheruk (Resident Geologist's Files)	[1]OFR 5332, p.J-7 (1981) [2]Annual Report, Asamera Inc. (1981)	Inactive
Jean Lake 42E/05NW	Li	1.689 MT @ 1.30% Li_2O	Golden Nugget Exploration Inc. (CMH 2000-2001, p.182; Resident Geologist's Files)	Jean Lake Lithium Mines Ltd., Annual Report (1957)	Inactive
Lac La Croix 52B/05SW	Li	1.525 MT @ 1.27% Li_2O	Within Quetico Provincial Park	AF	Mining Lease of Occupation expired in 1970
M.N.W. 52H/04NE	Li	40 000 T "high-grade Li"	Golden Nugget Exploration Inc. (CMH 2000-2001, p.182; Resident Geologist's Files)	Geological Survey of Canada, Economic Geology Report 21, p.61 (1965)	Inactive
Marathon prospect 42D/16SW	Cu, Ni, PGE	44 million tons @ 0.37% Cu, 0.047% Ni; PGE values	Polymet Mining Corp. (CMH 2000-2001, p.322); currently optioned to Geomaque Explorations Ltd.	CMH 1998-99, p.367	Plans to maintain leases in good standing; feasibility study conducted in 1989; exploration resumed in 2000

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
McVittie 52H/08NE	Li	261 000 T @ 1.03% Li_2O	Golden Nugget Exploration Inc. (CMH 2000-2001, p.182; Resident Geologist's Files)	GR 31, p.89 (1965)	Inactive
Nama Creek 52H/08NE	Li	4 292 232 tons @ avg. 1.06% Li_2O	Coniagas Resources Limited (CMH 2000-2001, p.109)	CMH 1999-2000, p.347	Inactive since 1957
Nicopor 42D/14NW	Ni, Cu	185 000 T @ 0.48% Ni, 0.26% Cu (0-90 m); plus 190 000 T @ 0.40% Ni, 0.12% Cu (90-180 m)	B. Fowler and M. Shuman	Zenmac Metal Mines Ltd., Annual Report (1970)	Optioned by Sterlingmarc Mining Ltd 1997; returned to vendors 1998
North Shores 42D/14SW	Au	Geological reserves of 2Mt @ 2.2 gpt Au (Afric Zone)	Autotrac Ltd. (currently optioned to International Taurus Resources Inc.)	Resident Geologist's Files	Explored in 1997 by Cyprus Canada Inc.; currently optioned to International Taurus Resources Inc.
Ontario Lithium (Jackpot) 42E/05SW	Li	1.18 MT @1.084% Li_2O	International Precious Metals Corporation (CMH 1997-98, p.250) [company address and status unknown; CMH 2000-2001, p.220]	CMH 1997-98, p.250	Drilling in 1994
Pistol Lake 52B/09NW	Au	9.6 mt @ 1.4 g/t Au or 2.9 mt @ 2.6 g/t Au	D. Parker and B. D'Silva	Resident Geologist's Files	Drilled by Detector Resources Ltd. 1994-95
Powell 52B/07SW	Au	250 000 T @ 0.25 opT Au	Saganaga Resources	NM, Jan. 22, 1990	Milling bulk sample on site, 1992
Prairie Lake 42E/02SE	U, Nb, REE, wollastonite	200 000 T @ 1.8 lbs/T U_3O_8, 5.0 lbs/T Nb_2O_5	AJ Perron Gold Corp. (CMH 1996-97, p.26) [company delisted 1998; CMH 2000-2001, p.23]	NM (03/05/79)	Prefeasibilty study on cement/lime products completed with positive results; AJ Perron Gold Corp delisted 20/01/98
Sapawe Mine 52B/14SW	Au	528 614 T @ 0.31 opT Au	Allegheny Mines Corporation (CMH 1999-2000, p.28) [company delisted 1999; CMH 2000-2001, p.26]	Press release, March 10, 1995	Diamond drilling, 1995
Sawbill Lake 52B/14	Au	66 600 T @ 0.20 opT Au		OFR 5332, p.J-4 (1981)	
Schreiber-Pyramid 42D/14SE	Au	107 T @ 0.71 opT Au	B. Fowler (Resident Geologist's Files)	Resident Geologist's Files	Inactive; last worked in 1992
Silver Mountain 52A/04NW	Ag	60 000 T @ 5.0 opT Ag, 12% CaF_2		NM (28/10/54)	

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Silver Islet 52A/07SW	Ag	115 000 T @ 40 opT Ag in dump[1], plus 300 000 oz Ag in roof pillar[2]; or 1 050 000 oz Ag[3], plus 750 000 oz Ag in pillars and stopes[4]	Cross estate (Resident Geologist's Files)	[1]MP 71, p.44 (1976) [2]MRC 10, p.74 (1968) [3]NM (18/10/79) [4]NM (10/02/83)	Dump material processed *ca.*1984 by QC Explorations Ltd.
Snodgrass Lake 52B/10SE	Au	60 mt @ 1.1 g/t Au	Moss Lake Gold Mines Ltd. (CMH 2000-2001, p.268)	CMH 2000-2001, p.268	1996 evaluation work and drilling; seeking JV partner
Stewart / Fire Tower 52A/12SE	Au	60 000 t @ 3.0 g/t Au	M. Stewart	Resident Geologist's Files	Last explored by Avalon Ventures Ltd. 1997-1998
Sunbeam 52B/14	Au	4410 T @ 0.42 opT Au	Allegheny Mines Corporation (CMH 1999-2000, p.28) [company delisted 1999; CMH 2000-2001, p.26]	OFR 5332, p.J-2 (1981)	Acquired by Allegheny Mines Ltd. in 1996 (company delisted 1999)
Swamp River 52B/09SE	Au	998 000 T @ 0.12 opT Au (incl. 675 000 T @ 0.146 opT Au)	Band-Ore Resources Ltd. (CMH 2000-2001, p.52)	CMH 2000-2001, p.52	Bulk sample, feasibility study 1975; drilling 1987, 1995
Vanguard 52B/09NW	Cu, Zn, Au, Ag	East Vanguard: 100 000 T @ 1.8% Cu, 3.4% Zn, 0.22 opt Ag, 06 to 0.19 opT Au; West Vanguard: ~200 000 T @ 1.3% Cu, 1% to 2% Zn, 0.28 opT Ag	C. Bumbu, M. Fogen and J. Martin (Resident Geologist's Files)	News release, Allegheny Mines Corporation, Nov. 4, 1997	Drilling by Allegheny in 1997; 1998 exploration (company delisted 1999)
Vegan 42E/05SW	Li	750 000 T @ 1.38% Li_2O	Golden Nugget Exploration Inc. (CMH 2000-2001, p.182; Resident Geologist's Files)	NM (22/03/56)	Inactive
Willecho and Willroy 42F/04NW	Cu, Zn, Ag	759 448 T @ 4.42% Zn, 0.28% Cu, 1.47 opt Ag (combined)	Noranda Inc. (The Chronicle-Journal 25/10/98)	Willroy Mines Ltd., Annual Report (1976)	Past producers; last optioned/worked by Noranda Mining and Exploration Inc.
Winston Lake 42D/14NW	Cu, Zn	598 000 t @ 1.0% Cu, 21.2% Zn (incl. 33% dilution)	Inmet Mining Corporation	Inmet Mining Corporation, pers. comm., 1999	Mine closed, February, 1999
Wisa Lake 52C/08NE	Li	330 000 T @ 1.15% Li_2O	Open for staking	Manager's Report, Lexindin Gold Mines Ltd. (1958)	Diamond drilling, 1950s

Notes: GR31 is Pye (1965); OFR 5332 is Neilson and Bray (1981); MP71 is Kustra (1977).

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Ontario

Ontario Geological Survey
Regional Resident Geologist Program

Northwest Regional Land Use Geologist District – 2000

by

R. Debicki and A. Drost

2001

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Regional Land Use Geologist – Northwest

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INTRODUCTION

Over the past several years, the Government of Ontario has re-engineered the way it delivers services to the people of Ontario. The changes that may be most familiar to the exploration community are the centralization of the Mining Recorders in the province and the posting of claim maps and claims information on the Ministry's website. At the same time, other changes have happened in other ministries throughout government. Some of them have had implications for the Resident Geologist Program.

As a result of these modifications, staff of the Resident Geologists Program have found themselves dealing with new clients in government, agencies, and non-governmental organizations, and delivering services that they had not delivered in past. These new services are important. Many of them relate to land use planning matters that are of interest to, or may directly affect, prospectors and developers. Many of them require knowledge and expertise that are outside the traditional knowledge and experience of professional geoscientists.

Some of these services relate to managing Crown land. They include working with the Ministry of Natural Resources to implement *Ontario's Living Legacy* which involves the establishment of 378 new parks or park expansions and conservation reserves across Ontario, and defining areas of "provincially significant mineral potential" within these new protected areas where mineral exploration will be allowed to proceed. They include administering work permits required for exploration activity in defined environmentally sensitive areas where natural heritage values need special protection, and ensuring that the mineral sector's interests are considered and accommodated in other land use planning initiatives such as forest management plans and the sale and transfer of Crown land.

Other services relate to municipal planning. They include working with Ministry of Municipal Affairs and Housing to review new municipal Official Plans, Official Plan Amendments, and consents (lot severances). Changes made to the *Planning Act* in 1996 recognize the interests of the mineral sector and the importance of protecting areas of high mineral potential from incompatible uses, and require that these considerations be factored into the municipal planning process. These considerations are important in the north where municipalities encompass huge tracts of land, including large areas of base and precious metals potential. They are also important in the south where industrial minerals are essential to the current, rapid expansion of existing communities and to the development of new ones.

In addition, there are emerging requirements for staff of the Resident Geologist Program to help ensure that access to the land base remains open to the exploration community, and to work with First Nations and the mineral sector to develop shared understanding of the other's rights, obligations, and interests in mineral exploration and development on Crown land.

These new and emerging needs were resulting in Resident Geologist Program staff having to divert their energies away from the traditional client services provided to the exploration and development community to attend to land use planning matters. On average, about 20 per cent of staff time was being

directed toward such work – although in Southern Ontario, land use planning consumed as much as 75 per cent of staff time. The end result was less time being available for delivering the level of traditional program services to which mineral industry clients had become accustomed.

To address these converging concerns, three new positions were created and the new "Regional Land Use Geologists" were hired in the autumn of 2000 to alleviate some of the pressures that impacted on the program. These new positions combine geoscience and mineral sector expertise with an understanding of land use legislation, regulations and issues.

Regional Land Use Geologists

Abraham Drost, the Regional Land Use Geologist based in Thunder Bay, is responsible for matters related to land use in the Red Lake, Kenora, Thunder Bay North and Thunder Bay South Resident Geologist districts. He has an M.Sc. degree in geology and a Certificate in Environmental Assessment, and has studied real estate law. Abraham has 16 years' experience in mineral exploration and development and was involved in the discovery of the past-producing Golden Patricia gold mine in northwestern Ontario. He has served on the executive of prospectors' organizations in Thunder Bay and Timmins.

Gord Yule, the Regional Land Use Geologist based in Timmins, is responsible for matters related to land use in the Timmins, Kirkland Lake, and Sault Ste. Marie Resident Geologist districts, plus those portions of the Sudbury Resident Geologist District north of the French River. He has a B.Sc. degree in geology, and 25 years' experience in mineral exploration, during which time he has been involved in the discovery of eight deposits in northeastern Ontario, including five past and present producers.

Dave Rowell, the Regional Land Use Geologist based in Sudbury, is responsible for those portions of the Sudbury Resident Geologist District south of the French River, including Manitoulin Island, plus the Southwestern Ontario and Southeastern Ontario Districts. Dave has an M.Sc. degree in Physical Geography, and 18 years' experience in mapping surficial geology and defining and managing aggregate and industrial mineral resources in the private sector and with the Government of Ontario.

The boundaries of the Regional Land Use Geologist Districts are shown on the map included in the preface to this report.

The result of these appointments, which mark the first significant increase in Resident Geologist Program staff in many years, will be twofold. There will be a reduction of the workload relating to land use issues for other Resident Geologist Program staff, allowing them to concentrate more fully on "traditional" services including:

- maintaining and providing access to assessment files, the drill core library system and other geoscience databases;
- providing information and expert advise on local geology and its mineral endowment;
- conducting client property visits and geology field trips; and
- monitoring exploration activity and generating new recommendations for exploration.

The Regional Land Use Geologists will focus their attention on "emerging" services including:

- providing mineral-related information in support of Crown land planning;

- protecting mineral resources and operations from "sterilization", and people and property from mining and natural hazards during municipal planning; and
- helping explorationists and First Nations understand each other's interests, activities and obligations in mineral exploration and development.

The Resident Geologist Program has created these new staff positions to ensure that knowledgeable service is provided regarding these and other land use issues, since finding solutions to these matters is vital to the health and sustainability of the mineral sector. Liaison with and input from mineral sector representatives, including local prospectors and their associations, will form an essential contribution to the successful delivery of land use planning services that support mineral exploration and development.

REGIONAL LAND USE GEOLOGIST ACTIVITIES

Crown Land Planning

The Ministry of Natural Resources manages Crown land in Ontario through the *Public Lands Act*, the *Parks Act*, the *Aggregate Resources Act*, the *Crown Forest Sustainability Act*, the *Conservation Authorities Act*, the *Oil, Gas and Salt Resources Act*, and other acts. The Ministry of Northern Development and Mines also contributes to Crown land management in the province through the *Mining Act*.

The Regional Land Use Geologists are working closely with Ministry of Natural Resources and their partners in several key areas. They are helping implement the *Ontario's Living Legacy* land use strategy by assisting in the regulation process for the new parks and conservation reserves, and in the development and application of criteria to allow "controlled exploration" in areas within those protected sites where there is provincially significant mineral potential.

They are helping to develop guidelines for the nine "Signature Sites" identified through the *Ontario's Living Legacy* land use strategy; reviewing management plans for both existing and new protected areas; and contributing to other land use planning and policy matters such as the Niagara Escarpment Plan.

The Regional Land Use Geologists are also working to help the mineral exploration and development community understand the forest management planning process, and to know how and when prospectors and developers should participate to ensure that their interests are considered. Forest management plans set the framework for activities in forest units for twenty-year spans, and establish the schedule and locations for access routes during that time. In addition, the Regional Land Use Geologists are working with the Ministry of Natural Resources to establish strategies for allowing the mineral sector to continue to access existing forest access roads.

Development on Private Land

The Ministry of Municipal Affairs and Housing manages planning on private land in Ontario through the *Planning Act*, the *Municipal Act*, and other legislation. Through their one-window approach, the Ministry of Northern Development and Mines (MNDM) contributes to municipal planning by providing mineral-related technical information regarding private land to municipal governments,

provides advice on planning matters that may affect mineral exploration and development, and comments on areas of mineral potential or mining-related hazards.

In conjunction with other program staff, the Regional Land Use Geologists review and comment on draft municipal Official Plans and Official Plan Amendments along with other planning matters including subdivision plans and consents (lot severances) where the approval authority lies with the Province of Ontario. They also provide training sessions and reference materials to representatives the Ministry of Municipal Affairs and Housing and to municipal planners representing communities across the province. In addition, they may be called upon to serve as "expert witnesses" in cases where planning decisions are being reviewed by the Ontario Municipal Board or other tribunals.

First Nation Interests

First Nation communities across Ontario are looking for new economic opportunities. As well, they are asserting their Aboriginal rights and claiming higher levels of involvement and control concerning economic activity on Crown land within their traditional areas. As a result of a lack of clarity regarding Aboriginal rights on one hand, and some First Nations' lack of familiarity with the "mining sequence" on the other, conflicts have arisen between some explorationists and developers and certain First Nations.

The Regional Land Use Geologists are working with the mineral sector and with representatives of other government ministries and First Nation communities to establish mutual understanding of the actions, implications, and obligations of mineral exploration and development workers, and to facilitate their activities on traditional lands. This work includes sharing information concerning Aboriginal rights and the related obligations of the mineral sector, and discussing the stages of the mining sequence and resulting business opportunities with First Nation community members. The Regional Land Use Geologists are also helping resolve certain land claims in their respective areas.

REGIONAL DISTINCTIONS

It is worthwhile to note that there are significant differences between the critical land-use planning concerns in different parts of Ontario. Northwestern Ontario can be considered the province's "exploration frontier" while northeastern Ontario is an area of more mature exploration and established mining. Southern Ontario is more populated and mineral sector interests are concentrated on a growing industrial mineral and aggregate industry. Each region has its distinct assemblage of planning-related issues.

Northwestern Ontario, the province's "exploration frontier", is characterized by large tracts of open Crown land. Forest management and logging activities are regionally important and First Nation communities throughout the region are expressing their interest in Aboriginal rights. The area has limited infrastructure and access to remote areas, and is considered under-represented in terms of protected areas.

Northeastern Ontario has a high density of mining land tenure and numerous producing and past-producing mines. Forest management and logging activities are also regionally important and there are local to widespread Aboriginal issues. The area is also considered to be under-represented in terms of protected areas, but has more urbanization, infrastructure and private land holdings than northwestern Ontario, making it more difficult to identify unencumbered lands that may be set aside to protect and preserve natural heritage values.

Southern Ontario is an area with much higher population density and a relatively small amount of Crown land, and a greater focus on a growing industrial mineral and aggregate industry. There is major urbanization and well-developed infrastructure, however the high population density leads to greater opposition to many mineral-related activities and developments.

NORTHWESTERN ONTARIO ACTIVITIES

Introduction

There are at least 12 major provincial legislative acts, with accompanying regulations, guidelines and policies developed by several provincial ministries that relate to land use in Ontario. Some apply to Crown land while others apply to private land. The Regional Land Use Geologist combines geoscientific, mineral exploration and development expertise with an understanding of provincial legislation, regulations, policies and land use issues in order to optimize Ontario's land base for sustainable, safe and environmentally responsible mineral resource development.

The Northwest Regional Land Use Geologist delivers on this mandate with other provincial ministries, municipalities, land-use interest groups and First Nations within the region to address matters including implementing the *Ontario's Living Legacy* land use strategy, preparing forest management plans and monitoring development on private land.

Ontario's Living Legacy Land Use Strategy

A total of 96 *Ontario's Living Legacy* sites are identified as new protected areas in northwestern Ontario. These include 21 new provincial parks or additions to existing parks (designated P-series), and 75 new conservation reserves (designated C-series). Thirty-five of the new parks and conservation reserves in the northwest have been announced for regulation by the Ministry of Natural Resources (MNR) by early 2001. All new proposed protected areas were reviewed by the Regional Land Use Geologist in order to ensure that pre-existing mining land tenure was properly designated as Forest Reserve, i.e. areas in which mineral exploration will continue to be allowed as long as the mining land tenure remains in good standing. The Regional Land Use Geologist also participated on the Lake Nipigon Basin Signature Site planning team.

The *Ontario's Living Legacy* land use strategy allows for controlled mineral exploration in specified areas within new parks and conservation reserves identified as having "provincially significant mineral potential" (PSMP). If a mineral discovery is made in such an area and the site develops into an advanced exploration project or a new mine, the area of the discovery or proposed disturbance will be de-regulated and an appropriate, alternative area of equal size and natural heritage value will be regulated as protected area. Upon site rehabilitation at the completion of the exploration/mining activity the deregulated land will be returned to park status.

The Regional Land Use Geologists have contributed to a committee of industry and government representatives assembled to define the criteria for "provincially significant mineral potential" and a process for ranking the potential of areas of interest. At the time of writing, the process for defining PSMP is currently close to completion. It is envisioned that this mineral potential evaluation process will be incorporated into future land use planning activities and initiatives for both Crown and private lands in the province.

Forestry Management Plans

The Regional Land Use Geologist, in co-operation with the Ontario Prospectors Association (OPA), has spearheaded development of a Microsoft® Access® database of information related to Forest Management Plans in Ontario for use by clients and those involved in the forest management planning process. The database is part of a larger effort to co-ordinate MNDM and OPA planning interests in the context of forest management planning and to stimulate the proactive involvement of the prospecting and exploration community in the planning process.

Development of formal "Guidelines for Strategic Access to Mineral Values" by the Regional Land Use Geologist is a further extension of joint MNDM-OPA co-operation in planning interests. It is envisioned that these guidelines will eventually be included as a formal part of forest management planning process in Ontario. Access to known mineral values and areas of significant mineral potential would then be optimized as new forest-access roads are planned and built by the forest companies operating throughout the province.

Development on Private Land

The Northwest Regional Land Use Geologist reviewed a total of 24 applications for development on private land in the last quarter of 2000. Most files were circulated for review and comment by a partner ministry, the Ministry of Municipal Affairs and Housing (MMAH). All applications were reviewed for their impact on mineral exploration and development opportunities and activities within areas of high mineral potential, and for their proximity to mine hazards.

Further effort, including a site visit and presentation to a town council, was made in reference to a site under application by a private developer wanting to subdivide patented mining claims for cottage lot development. An increasing number of such applications are under evaluation by the Ministry. All are considered in the context of the mineral potential of the sites and the presence of mine hazards that may pose potential public safety and environmental concerns.

First Nation Interests

The Northwest Regional Land Use Geologist provided assistance to a junior exploration company with regard to their plans for conducting mineral exploration on claims within Aboriginal traditional lands. Exploration and development activities in remote parts of the northwest and other regions of the province are increasingly becoming issues for discussion between explorationists and Aboriginal communities intent on building greater autonomy and economic self-reliance. Increasingly, explorationists are entering into a Memorandum of Understanding (MOU) with individual Aboriginal communities that identify the terms and conditions for releasing information to the First Nations and for respecting the natural environment.

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.